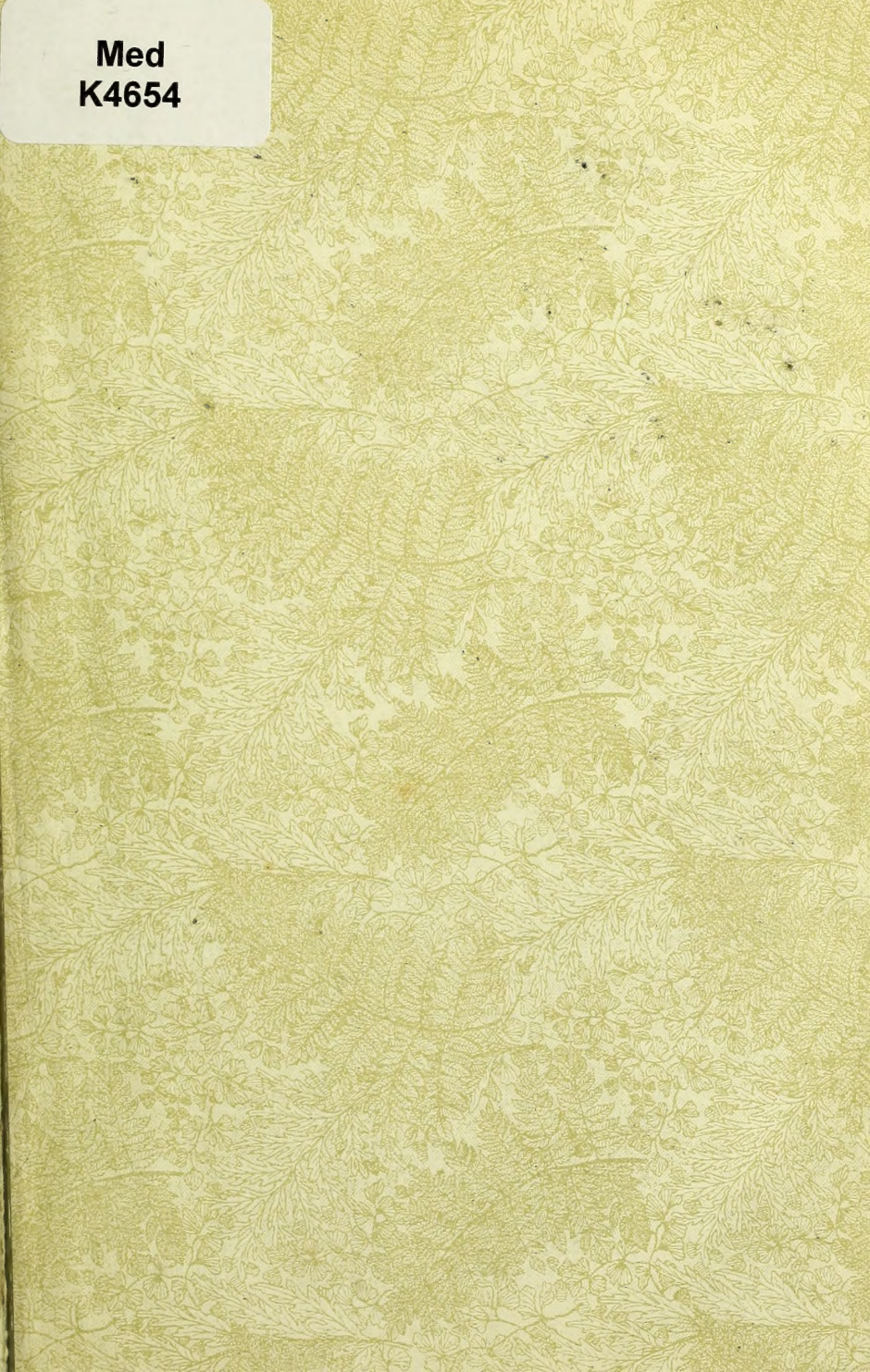




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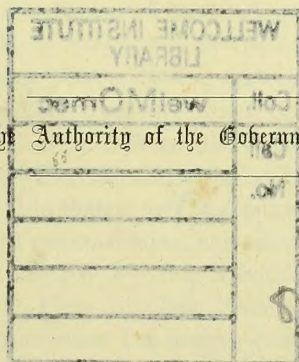
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MANUAL
OF THE
NEW ZEALAND FLORA.

BY
T. F. CHEESEMAM, F.L.S., F.Z.S.,
CURATOR OF THE AUCKLAND MUSEUM.

Published under the Authority of the Government of New Zealand.



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PREFACE.

FORTY-TWO years have elapsed since Sir J. D. Hooker published the first part of his "Handbook of the New Zealand Flora." Although no complete account of the plants of the colony has since been prepared, botanical investigations have been actively and zealously carried on, and a large amount of fresh material obtained. No less than four hundred separate communications or short papers dealing with the botany of New Zealand have been published, and the number of new species proposed is considerably over a thousand. The literature and descriptions of the new species are scattered through the thirty-seven volumes of the Transactions of the New Zealand Institute and other publications, some of which are not readily accessible to the majority of workers in the colony. To make satisfactory use of such a mass of unarranged and undigested material is beyond the power of any except a few experts: in any case an attempt to do so would prove both tedious and troublesome. In short, the want of a compendious Flora has long been a serious hindrance to the study of the indigenous vegetation, and a bar to inquiries of any kind connected therewith.

For many years New Zealand botanists hoped that the preparation of a new Flora would be undertaken by the late Mr. T. Kirk. It was known that he had long been collecting material for such a work. His many journeys, extending from the North Cape to the Auckland and Campbell Islands, had given him an unrivalled personal acquaintance with the vegetation, while his numerous writings afforded abundant proof of widespread knowledge, and of accurate and careful botanical research. Under such circumstances, the announcement made in 1894 that he had been engaged by the New Zealand Government to prepare a "Students' Flora of New Zealand" was received with general approval. And when his death occurred in 1897 it was a disappointment to find that barely two-fifths of his task had been completed. This portion has since been printed by the Government, and its value intensifies the regret that the author did not live to complete the work for which he had made so much preparation, and for which he possessed so many undoubted qualifications.

The publication of the fragment left by Mr. Kirk made the want of a complete Flora still more apparent, and in April, 1900, the Government was pleased to intrust me with the preparation of such a work. While allowed full freedom of action in all details, I was instructed to follow the general plan adopted in Sir J. D. Hooker's "Handbook," which, as is well known, was based upon that recommended many years ago by Sir W. J. Hooker for a uniform series of Floras of all the British colonies. With the view of keeping the work within the compass of one volume of portable size, I was further directed to confine it to the indigenous plants, thus departing from the plan followed by Kirk, who included all well-established naturalised plants, distinguishing them from the native species by a difference in the type.

The "Manual of the New Zealand Flora," which is the title adopted for the present work, is intended to comprise within a reasonable compass full descriptions of the whole of the indigenous flowering-plants and ferns found within the limits of the Colony of New Zealand, including not only the two main Islands, but also the outlying groups of the Kermadec Islands, the Chatham Islands, the Auckland and Campbell Islands, Antipodes Island, &c. I have also included Macquarie Island, for although it is politically an appanage of Tasmania, it is more closely allied in its flora and fauna to the Auckland and Campbell Islands than to any other land. In addition to the descriptions, I have given as fully as possible the geographical and altitudinal range of each species within the colony; and, in the case of non-endemic plants, a short statement of their range in other countries. I have also inserted, in a concise form, such general information, whether economic or scientific, as appeared to be of sufficient value. Believing that the main object of a Flora is to afford a ready means of determining the name of any species for the purpose of ulterior study, I have endeavoured so to frame the descriptive matter as to facilitate the work of identification as much as possible. I have therefore prefixed to each order and each genus analytical keys in which the salient characters of the genera and species are contrasted. With respect to the descriptions themselves, they are in almost all cases original, and have been based on the actual examination of living or dried specimens, usually both. After their preparation they were compared with those of my predecessors, and particularly with those of Hooker and Kirk, when any additions or alterations that appeared

to be necessary were made. With regard to the citation of previous authors, I have as a rule considered it unnecessary to do more than quote the publications that deal solely or mainly with New Zealand botany, such as Forster's *Prodromus*, A. Richard's *Flora*, Cunningham's *Precursor*, Raoul's *Choix*, and the works of Hooker and Kirk. Had I given references to general works on botany or to special monographs, the bulk of this work would have been greatly increased without sufficient corresponding advantage. I have, however, quoted the publication in which the species under consideration was first described; and, in the case of those plants which extend to Australia or Tasmania, I have usually given a reference to Bentham's "*Flora Australiensis*" or Hooker's "*Flora of Tasmania*." The synonymy I have treated in a similar manner. As far as the information at my command would permit, I have quoted all published names of endemic New Zealand plants, and all names founded upon New Zealand specimens. Further quotation would, in my opinion, be neither necessary nor expedient for the purposes of this work.

Every botanist who prepares a *Flora* starts from the standpoint reached by his predecessors in the same field. In the subjoined history of botanical discovery in New Zealand I have endeavoured to give a sketch of the labours of all those who have investigated the botany of the colony, either as authors or collectors, and who have thus assisted in providing material for future study and research. But, in addition, it is advisable to briefly mention the chief material upon which the present work is founded. At the outset I must state that I have relied very largely upon my own notes and observations, formed during thirty-five years' continuous study of the flora, and upon my herbarium, which I believe to be the largest and most complete formed by individual effort within the colony.

I am indebted to the Education Department for the loan of that portion of the herbarium of the late Mr. Kirk which after his death was purchased by the New Zealand Government. Although comprising only a small part of the collections formed by this active and enterprising botanist, it nevertheless includes excellent and well-selected specimens of most of the species of the flora, including the types of the new species described by him, and has consequently proved an important aid to me. It is to be regretted that Mr. Kirk's botanical papers and other manuscripts, none of which I have seen, were not included in this purchase.

The Education Department has also placed at my service a set of the plants collected by Banks and Solander during Cook's first voyage, a transcript of Solander's manuscript descriptions, and a set of impressions from the copper plates prepared by Sir Joseph Banks to illustrate the descriptions. All these were presented to the Government a few years ago by the Trustees of the British Museum, and form a unique and valuable addition to the public collections of the colony.

I am indebted to my friend Mr. D. Petrie, well known for his successful explorations in the Otago District, for the very valuable and important aid afforded by the study of his herbarium, which he has loaned to me in instalments during the progress of this work. It is specially rich in specimens of the rarer alpine plants of Otago, which, as a rule, are very poorly represented in other collections.

The herbarium of the late Mr. Colenso has been lent to me by Mr. H. Hill, one of the trustees under his will. It contains a large amount of material, collected at various times between the years 1840 and 1898, but is to a great extent unarranged and unclassified. Fortunately, however, it includes named specimens of many of the supposed "new species" described by him during the last fifteen years of his life, and has thus enabled me to come to more certain conclusions respecting them than would otherwise have been the case.

The private herbarium of the late Mr. John Buchanan has been forwarded for my inspection by the Council of the Otago University, to which body it was bequeathed. Although but a fragment of the collections he formed during his lifetime, it has been of considerable service, as it includes the types of most of his new species, and the drawings and analyses prepared for his work on the New Zealand grasses.

My friend Dr. Cockayne has supplied me with much valuable information, and a considerable amount of interesting material from the Southern Alps, the Chatham Islands, and other localities explored by him. Many of his specimens have been of particular value, from being specially selected to show the range and trend of variation in some of the more variable species of the flora.

The Right Rev. W. L. Williams, Bishop of Waiapu, has placed me under many obligations by regularly forwarding specimens collected by him in the East Cape and Hawke's Bay districts, and by his invaluable help in compiling the list of Maori plant-names given in the Appendix.

Mr. W. Townson, of Westport, has for many years supplied me with numerous sets of specimens, both fresh and dried, collected by him in the south-west portion of the Nelson Provincial District, and often obtained from out-of-the-way localities and at considerable altitudes. So little was previously known respecting the botany of this portion of the colony that his collections and notes have been of great service to me.

I am indebted to Mr. A. Hamilton for the loan of his extensive collection of the ferns of the colony. This is not only unusually complete and well arranged, but also contains many specimens of crested and other abnormal varieties.

I have also to record my thanks to Sir James Hector, Mr. J. D. Enys, Mr. G. M. Thomson, Mr. H. Hill, Mr. Justice Chapman, Mr. Percy Smith, Mr. H. J. Matthews, Mr. F. R. Gibbs, Mr. J. H. Macmahon, Mr. J. Adams, Mr. R. H. Matthews, Mr. H. Carse, Mr. Elsdon Best, Mr. R. J. Kingsley, Rev. F. R. Spencer, Mr. H. C. Field, Mr. J. Rutland, Mr. F. A. D. Cox, Mr. J. Hall, Mr. H. H. Travers, Mr. J. B. Simpson, and several others, for the material assistance they have rendered me.

Turning from New Zealand, I have now to express my gratitude to several friends and correspondents in Europe. First of all, I wish to tender my special thanks to Sir J. D. Hooker, who during a correspondence extending over thirty-five years has been at all times ready to give me the benefit of his wide knowledge and experience, and who has evinced the greatest possible interest in the inception and progress of this work. My thanks are also due to Sir W. T. Thistleton-Dyer, the present Director of Kew, for his kindness in granting facilities for the comparison of my specimens with the types preserved in the Kew Herbarium, and for other valuable assistance; also to Mr. W. B. Hemsley, the Assistant Director, who has given me much helpful aid with the greatest readiness and kindness; and to Mr. N. E. Brown, who was specially instructed by the Director to make a comparison of my specimens with the types of the species in *Veronica*, *Gentiana*, *Myosotis*, and other genera, and whose report on the subject has been invaluable to me. I am also greatly indebted to Mr. C. B. Clarke for his unwearied kindness in supplying me with information and critical notes respecting the New Zealand *Cyperaceæ*, and for furnishing me with a list of the synonymy of the species. Pastor G. Kukenenthal, of Grub, near Cobourg, has also contributed valuable notes respecting the New Zealand species of *Carex* and *Uncinia*. Finally, I am under

many obligations to Professor E. Hackel, of Graz, Austria, for undertaking a critical examination of the whole of the New Zealand grasses, and for furnishing me with a series of very full and complete notes, with permission to use the same for the purposes of this work.

The elimination of the naturalised species from the present work, although absolutely necessary to keep it within the limits of a single volume, will not be altogether satisfactory to the student. A beginner cannot be expected to distinguish between the indigenous and introduced species, especially when it is remembered that in several districts the latter now constitute the larger portion of the flora, and that there is no part of the country, however remote, into which some plants of foreign origin have not penetrated. Altogether, over six hundred species, or nearly one-half the number of the indigenous flowering-plants, have succeeded in establishing themselves. I am not without hopes that I may be enabled to prepare a supplementary volume containing concise but sufficient descriptions of the foreign element of the flora; for this alone will remove the inconvenience resulting from the want of a ready means of determining all the plants which a student may observe in any district. In the meantime, I have given in the Appendix a nominal list of all well-established naturalised plants, with references to books in which descriptions of them can be found. As most of the species are of European origin, I would recommend the student to provide himself with a copy of Hooker's "Students' Flora of the British Islands," or some similar work, and to use it in conjunction with this publication.

It is not to be expected that a work containing descriptions of over 1,550 species of plants can be prepared without the occurrence of errors and imperfections, and for these I must ask the indulgence of the reader. One serious disadvantage under which I have laboured, and which I share in common with all colonial botanists, is the impossibility of examining those European herbaria in which the types of so many of the published species are deposited; and consequently mistakes may have been made in the identification of the species, especially in genera like *Veronica*, *Gentiana*, *Myosotis*, &c. But I trust that the number of such errors is not large. Their detection may be safely left to future workers.

A few statistics respecting the extent and composition of the flora may be of interest. The total number of species described, including a few additions given in the Appendix, is 1,571, of which 1,415 are

phænogams, and 156 vascular cryptogams. These are contained in 382 genera, distributed in 97 orders. The average number of species to each order is slightly over 16; the average number of species to each genus rather more than 4. The orders containing more than 24 species are as under :—

Compositæ 221	Ranunculaceæ 50
Filices 138	Rubiaceæ 47
Cyperaceæ 119	Epacridæ 31
Scrophularinæ 113	Onagrarieæ 31
Gramineæ 113	Leguminosæ 26
Umbelliferæ 62	Juncaceæ 25
Orchideæ 57	Boraginaceæ 25

The *Compositæ* thus constitute one-seventh of the whole flora, an unusually high proportion. The genera containing twenty species or more are :—

Veronica 84	Senecio 30
Carex 54	Epilobium 28
Celmisia 43	Poa 25
Coprosma 40	Myosotis 23
Ranunculus 38	Hymenophyllum 20
Olearia 35	

Of the total number of species (1,571) no fewer than 1,143, or nearly three-quarters of the entire flora, are peculiar to the colony. With respect to the 428 species which are found elsewhere, 366 extend to Australia, and 108 to South America. Coming to the local distribution of the species, 789 are found in both the North and South Islands, 219 occur in the North Island but have not yet been detected in the South Island, while 456 species known to occur in the South Island have not been collected in the North Island. No fewer than 23 species are found in the Kermadec Islands but not in any other portion of the colony; 25 in the Chatham Islands; 10 in Stewart Island; and 48 in the outlying islands to the south of New Zealand, including in the term the Auckland and Campbell Islands, Antipodes Island, and Macquarie Island.

It now only remains for me to express my grateful thanks to the Education Department, under whose auspices the work has been prepared, for the readiness with which it has co-operated with me in endeavouring to render it as complete and reliable as possible. In this connection, I would specially mention the Right Hon. R. J. Seddon.

Minister of Education, and Mr. G. Hogben, M.A., the Inspector-General of Schools. My thanks are also due to the Council of the Auckland Institute and Museum for kindly allowing me to engage a substitute to perform a portion of my duties at the Museum during the progress of the work. Finally, I have to express my obligations to the Government Printer for the assiduous care with which he has attended to the passage of the work through the press.

Auckland, January, 1906.

A HISTORY

OF

BOTANICAL DISCOVERY IN NEW ZEALAND.

THE history of botanical discovery in New Zealand falls naturally and conveniently into two periods of almost equal duration. The first commences with the year 1769, in which Cook made his first visit, and closes with the establishment of British supremacy and the commencement of systematic colonisation in 1840. During the seventy-one years comprised between these dates, many voyages of discovery or survey in the South Pacific were undertaken by the British, French, or American Governments, during most of which New Zealand was visited. And, as naturalists or collectors were usually attached to these expeditions, it was through them that our first knowledge of the flora was obtained. During the same series of years several travellers of scientific attainments also visited New Zealand, such as the two Cunninghams, Dieffenbach, Bidwill, &c., all of whom formed collections of considerable importance. This period may therefore be appropriately called the period of investigation by visitors from abroad. That extending from 1840 to the present time can be just as correctly styled the period of investigation by naturalists resident in the colony.

Commencing with the voyages, the first in order of time, as well as in degree of importance, is Cook's first visit (1769-1770). For full details concerning this celebrated expedition, which has been well said "to have been the most momentous voyage of discovery that has ever taken place, for it practically gave birth to the great Australian Colonies," I must refer the reader to Hawkesworth's "Cook's Voyages," Wharton's transcript of Cook's journal, and Hooker's "Journal of Sir Joseph Banks." For the purposes of this work the following sketch will be sufficient. Cook's ship, the "Endeavour," left England on the 26th July, 1768. For that period, she was unusually well equipped for scientific work. Sir Joseph Banks, one of the leading naturalists of his time, and a man of much influence and

ample fortune, volunteered to accompany the expedition. At his own expense he provided the requisites for making collections in every department of natural science, and engaged Dr. Solander, four draughtsmen or artists, and a staff of servants to accompany him. The cost to Banks of these preparations has been estimated at £10,000. After rounding Cape Horn, and after a stay of nearly four months at Tahiti and other islands of the Society Group, Cook struck south-westwards across the Pacific. On Friday, the 6th October, 1769, he first sighted New Zealand, and at once stood in for the land. Delayed by calms and baffling winds, it was not until the afternoon of Sunday, the 8th October, that he anchored on the north-west side of a deep bay, to which he afterwards gave the name of Poverty Bay, and almost directly opposite the present town of Gisborne. Cook immediately landed, accompanied by Banks and Solander, but an unfortunate skirmish took place with the Maoris, one of whom was shot, and the party returned to the ship. The next morning a landing was made in greater force, and some intercourse took place with the Maoris through the medium of a Tahitian interpreter. Their behaviour, however, was so threatening that it became necessary to fire upon them, and another man was killed and several wounded. Discouraged by this reception Cook once more re-embarked. The following morning another landing was effected, and Cook, together with Banks and Solander, strolled some little distance up the right bank of the Waikanae River. But the Natives again became troublesome, and a retreat had to be made to the landing-place. Seeing no hope of establishing a pacific intercourse, Cook returned to his vessel, and at daylight the following morning left the bay. Under the circumstances narrated above, it is obvious that little botanising could be done. Banks, in his journal, laments that "We took leave of Poverty Bay, as we named it, with not above forty species of plants in our boxes, which is not to be wondered at, as we were so little ashore, and always upon the same spot. The only time when we wandered about a mile from the boats was upon a swamp, where not more than three species of plants were found."

After leaving Poverty Bay, Cook followed the coast southwards, successively passing Table Cape, Portland Island, Hawke's Bay, and Cape Kidnappers, but nowhere making any attempt to land. On the 17th October, when off Cape Turnagain, he determined to return to the northwards, giving as a reason that there was "no likelihood of meeting with a Harbour, and the face of the Country Visibly altering for the worse." On the 19th he repassed Poverty Bay, and on the 20th anchored in Anaura Bay, which he called "Tegadoo." Here the reception given by the Natives was all that could be desired, and Cook consequently remained until daylight on the 22nd, for the purpose, as he states, of giving "Mr. Banks an opportunity to Collect a little of the Produce of the Country." Banks, in his journal, says, "We ranged all about the bay, and were well repaid by finding many plants

and shooting some most beautiful birds." Further on, he gives a description of the Maori cultivations, in which were planted "sweet potatoes, cocos, and a plant of the cucumber kind," doubtless referring to the kumara, taro, and hue. Dr. Solander, in his manuscript volume of descriptions, presently to be referred to, enumerates ninety-eight species of plants as having been collected at "Tigadu." Among these were the first specimens of the beautiful *Clianthus puniceus*, which was found cultivated by the Natives near their dwellings.

On taking his departure from Anaura, Cook at first stood to the northwards, but the wind being unfavourable, he determined to put into Tolaga Bay, where the Natives had informed him wood and water could easily be obtained for his ship. On the morning of the 23rd he accordingly anchored about a mile from a small cove just inside the southern point of the bay. Here a stay was made until the 30th October. The Natives were friendly and obliging, and an ample supply of wood and water was obtained. Both Banks and Solander passed most of their time on shore, and an excellent collection of plants was formed. With respect to the vegetation, Cook remarks, "The Tops and ridges of the Hills are for the most part barren, at least little grows on them but fern; but the Valleys and sides of many of the Hills were luxuriously clothed with woods and Verdure and little Plantations of the Natives lying dispers'd up and down the Country. We found in the Woods, Trees of above 20 different sorts; Specimens of each I took on board, as all of them were unknown to any of us. The Tree which we cut for firing was something like Maple and yielded a whitish Gum. There was another sort of a deep Yellow which we imagin'd might prove useful in dying. We likewise found one Cabage Tree which we cut down for the sake of the cabage. The Country abounds with a great Number of Plants, and the woods with as great a variety of beautiful birds, many of them unknown to us." Altogether, Tolaga Bay appears to have left a favourable impression on the "Endeavour's" people. From the localities cited in Solander's manuscripts, it appears that about 160 species of plants were collected.

Leaving Tolaga Bay on the 30th October, Cook made sail to the northwards. On the following day he rounded the East Cape, and passing Cape Runaway and White Island (which was evidently quiescent at that time), he coasted along the shores of the Bay of Plenty, having occasional intercourse with those Maoris who came off to him in their canoes, but making no attempt to land. On the 3rd November he was abreast of Tauranga, and on the 4th reached the entrance of Mercury Bay. Finding in this locality a secure harbour with plenty of wood and water, and being anxious to observe the transit of Mercury, which was to take place on the 9th, Cook brought his vessel to an anchor. During a stay of eleven days many plants were collected, figured, and described, the total number, reckoning from Solander's

manuscripts, being 213. Among those which had not been previously observed was the Mangrove (*Avicennia officinalis*), which occurred in such abundance along the sides of the Whitianga River that Cook gave it the name of the "River of Mangroves." Through a curious misapprehension he states that the mangroves "produce a resinous substance very much like Rosin. . . . We found it, at first, in small Lumps upon the Sea Beach, but afterwards found it sticking to the Mangrove Trees, and by that means found out from whence it came." The resinous substance was no doubt the now well-known kauri-gum, pieces of which are often drifted along tidal streams, and are not infrequently detained among the roots or lower branches of the mangrove. The kauri-tree itself does not seem to have been observed, either by Cook or by Banks and Solander, although common enough on the hills overlooking Mercury Bay. Probably they did not venture far enough from the coast to reach it.

After leaving Mercury Bay Cook continued to follow the coast-line, and rounding Cape Colville, entered the Hauraki Gulf. Here he found himself surrounded by islands, and not wishing to lose sight of the mainland, kept close under the western side of the Coromandel Peninsula. A short sail brought him to the entrance of the Thames River, where he anchored, almost directly abreast of the position where the town of Thames now stands. On the following day, the 21st November, accompanied by Banks and Solander, he made a boat voyage up the Thames River for a distance of twelve or fourteen miles. A landing was effected on the west side of the river for the purpose of examining the kahikatea forest which still clothes its banks, and which had attracted Cook's attention at his anchorage. Describing the trees, he says, "We had not gone a hundred yards into the woods before we found a Tree that girted 19 feet 8 inches, 6 feet above the ground, and having a Quadrant with me, I found its length from the root to the first branch to be 89 feet; it was as Streight as an Arrow, and Taper'd but very little in proportion to its length, so that I judged that there was 356 Solid feet of timber in this Tree, clear of the branches. We saw many others of the same sort, several of which were Taller than the one we measured, and all of them very stout; there were likewise many other sorts of very Stout Timber Trees, all of them wholly unknown to any of us. We brought away a few specimens, and at 3 o'Clock we embarked in order to return." It is somewhat distressing to state that the historic tree mentioned above, after surviving one hundred and thirty years with unimpaired vitality, was wantonly cut down only a few years ago.

From the Thames River Cook's course was directed to Cape Rodney, and from thence northwards to Cape Brett, which was reached on the 27th November. Here contrary winds were met with, and it was not until the 29th that the cape was weathered, and an anchorage found in the Bay of Islands, where the "Endeavour" remained until the

5th December. During this time visits were made to several of the islands in the bay, and to the mainland; but as it was impossible to go far from the coast, along which the vegetation was by no means varied, not many plants were collected, only seventy-seven being credited to the locality in Solander's manuscripts.

Leaving the Bay of Islands, Cook continued his survey of the coast to the North Cape, where he met with fierce and prolonged gales of such exceptional character that three weeks were occupied in rounding it. He then proceeded southwards along the western coast, but its dangerously open character prevented him from making a close approach. He consequently failed to observe any of the harbours—Hokianga, Kaipara, Manukau, Kawhia, &c.—and, as no canoes were seen, there was no intercourse with the inhabitants. He passed Mount Egmont on the 13th January, entered Cook Strait on the 15th, and on the 16th anchored in Queen Charlotte Sound, in the northern portion of the South Island. In this locality he made a stay of three weeks, taking advantage of his visit to careen and clean his ship, to lay in a stock of wood and water, and to give his crew the welcome change of a diet of fresh fish and green vegetables. He remarks that Queen Charlotte Sound “is a collection of some of the finest harbours in the world,” and that “the Cove in which we lay, called Ship Cove, is not inferior to any in the Sound, both in point of Security and other Conveniences.” He also says that the land “consists wholly of high hills and deep Valleys, well stored with a variety of excellent Timber, fit for all purposes except Ship's Masts, for which use it is too hard and heavy.” The collection of plants made was larger than that formed in any other locality, numbering 220 species.

Taking his departure from Queen Charlotte Sound on the 7th February, Cook first took a run northwards to Cape Turnagain, thus completing his survey of the North Island. He then turned to the south, passing down the east coast of the South Island. On the 17th February he rounded Banks Peninsula, which he took to be an island; on the 25th February he was off Cape Saunders; and on the 10th March he was abreast of the south end of Stewart Island, which he assumed to be a peninsula connected with the mainland by a narrow neck. On the 13th he passed the entrance to Dusky Sound, from whence he followed the western coast northwards, reaching Cape Farewell on the 24th March, and thus completing the circumnavigation of the South Island. On the 27th he put into Admiralty Bay, to the west of Queen Charlotte Sound, for the purpose of again renewing his stock of wood and water, and on the 31st he left New Zealand, steering a course for the east coast of Australia.

In 1771 Cook returned to England. The natural-history collections, which were the property of Sir Joseph Banks, contained a large amount of material; but no work has ever been published treating of them as a whole. The plants had for the most part been

fully described by Solander at the time of collection, and coloured drawings prepared of many of the species. Little additional labour was therefore required to prepare the results for publication. Evidently Banks intended that this should be done, for at his own expense he had 700 plates engraved on copper, and Solander's manuscript descriptions were revised and systematically arranged. The New Zealand portion, which was entitled "*Primiæ Floræ Novæ Zealandiæ*," contained descriptions of nearly 360 species, illustrated by over 200 plates, and was practically ready for the press. Why it was not actually published is by no means clear, but the suggestion has been made that publication was at first delayed by the preparations made by Banks and Solander to accompany Cook in his second voyage, a project which was ultimately abandoned; and that a more serious interruption was caused by Solander's somewhat sudden death in 1782. After his companion's decease, Banks became more and more occupied with his duties as President of the Royal Society, and as an organizer and promoter of scientific research, and the idea of publication appears to have been abandoned. As stated in the preface, a type-written copy of Solander's descriptions and a set of impressions from the plates have been liberally furnished by the Trustees of the British Museum for use in the preparation of this work. Of their scientific value I cannot speak too highly; and it is a matter for regret that they were not presented to the world 125 years ago. It is, however, some satisfaction to know that the botanical results of the whole voyage are now, after this long delay, being issued under the auspices of the British Museum, and under the careful editing of Mr. Britten.

On the 9th April, 1772, Cook left England for his second voyage, the expedition consisting of two ships, the "*Resolution*" under his own command, and the "*Adventure*" under that of Captain Furneaux. John Reinhold Forster and his son George Forster, both well-known botanists, accompanied him in the capacity of naturalists, and were joined at the Cape of Good Hope by Dr. Sparrmann, also a botanist of repute, and a former pupil of Linnaeus. After several months had been spent in an unsuccessful search for a southern continent, Cook made sail for the south of New Zealand. During the voyage he was accidentally separated from the "*Adventure*," and failing to rejoin her put into Dusky Sound, the entrance to which had been noticed in his first voyage. He remained there from the 26th March, 1773, to the 1st May, mainly for the purpose of refitting, and to give his crew a rest after the months of incessant buffeting experienced in high southern latitudes. During his stay many boat voyages were made to various parts of the Sound, and a careful survey was made of it. The two Forsters devoted much of their time to botanizing, but their collections were by no means so large as might have been expected, considering what a productive locality Dusky Sound has

proved to be in later years. Among the plants gathered were *Olearia operina*, *Celmisia holosericea*, *Gentiana saxosa* and *G. montana*, and *Cordyline indivisa*.

From Dusky Sound the "Resolution" proceeded northwards to Queen Charlotte Sound, which was reached on the 18th May. Here she rejoined the "Adventure," which had arrived on the 7th April. Both vessels left on the 7th June, in the first place for a cruise to the south-east of New Zealand, in further search for a southern continent, and then for eastern Polynesia. In October Cook again directed his course to New Zealand. Making the coast of the North Island near Table Cape, he steered to the south, stopping near Cape Kidnappers to give pigs and fowls to some Natives that came off to his ship. Up to this time the two vessels had been in company, but off Cape Palliser exceptionally severe weather was encountered, and they separated. The "Resolution" proceeded to Queen Charlotte Sound, which had been appointed a place of rendezvous, and remained there waiting for her consort from the 3rd November to the 25th, when Cook left for a cruise to the Antarctic Ocean. Five days after his departure the "Adventure" arrived, and remained until the 23rd December. During this stay an unfortunate dispute arose with the Maoris, which led to the massacre of a boat's crew of ten men. After a year's explorations in various parts of the Pacific, Cook once more returned to New Zealand, anchoring in his favourite resort, Queen Charlotte Sound, on the 19th October, 1774. His stay was but short, and on the 10th November he left on his return voyage, reaching Plymouth on the 30th July, 1775.

From the above sketch it will be seen that the only localities botanized in during Cook's second voyage were Queen Charlotte Sound, which had already been explored by Banks and Solander, and Dusky Sound. But a much longer period was spent in harbour and on shore than during the previous voyage, and the collections ought to have been quite as extensive. Instead of this, they were much smaller, the total number of flowering-plants and ferns not exceeding 180 species. Sets of these were distributed to several public and private herbaria, unfortunately in a somewhat careless manner as regards the nomenclature, thus causing many mistakes and much confusion. Within twelve months after their return the two Forsters conjointly issued a work entitled "*Characteres Genera Plantarum*," in which seventy-five new genera were shortly described and illustrated, thirty-one of them being from New Zealand. The book is interesting on account of containing the first published descriptions of New Zealand plants, but otherwise is most disappointing. The descriptions are short and meagre, and the illustrations so badly executed as to be practically useless. In 1786 George Forster published his "*Florulæ Insularum Australium Prodrômus*," which contains diagnoses of 594 species, about 170 of which have New Zealand assigned as a habitat.

As in the preceding work, the descriptions are short and unsatisfactory, and usually quite insufficient for the proper identification of the species. In the same year he also issued a little tract entitled "*De Plantis Esculentis Insularum Oceani Australis Commentatio Botanica*," which includes full descriptions and much curious information respecting the esculent plants, fifty-four in number, observed during the voyage, fourteen of which were from New Zealand. These three publications, together with a short essay, "*De Plantis Magellanicis et Atlanticis*," which contains no reference to New Zealand, appear to be the whole of the matter written by the Forsters respecting the botany of Cook's second voyage.

Cook's third and last voyage can be passed over with a few words. He left England on the 12th July, 1776, and after visiting the Cape of Good Hope, Kerguelen's Island, and Tasmania, reached his favourite anchorage in Queen Charlotte Sound on the 12th February, 1777, this being his fifth visit to the locality. His stay was brief, and on the 25th February he finally left New Zealand. Cook's surgeon, Mr. W. Anderson, had some knowledge of natural history, and his description of Queen Charlotte Sound, printed in Hawkesworth's "*Cook's Third Voyage*" (Vol. i., p. 145), contains an excellent account of the vegetation. His collections, however, were small and unimportant.

In 1791, Captain Vancouver, in command of the "*Discovery*," accompanied by Captain Broughton in the "*Chatham*," visited Dusky Sound, making a stay of nearly three weeks. The surgeon to the expedition, Archibald Menzies, devoted himself to the higher cryptogams, and made a large collection of ferns, mosses, and *Hepaticæ*. Many of his specimens were figured by Sir W. J. Hooker in the "*Musci Exotici*" or "*Icones Filicum*," together with a few flowering-plants in the "*Icones Plantarum*." A set of his collections is in the British Museum Herbarium, and another at Kew.

The first of the French voyages of discovery to touch at New Zealand was that of Captain De Surville, in the "*Saint Jean Baptiste*." De Surville arrived off Doubtless Bay in December, 1769, only three days after Cook had passed the same locality on his way to the North Cape. He remained three weeks at anchor in Mongonui Harbour, and was most hospitably treated by the Maoris, a hospitality which he returned by burning one of their villages and destroying their canoes, apparently because he suspected them of stealing a boat which had accidentally got adrift. I cannot learn that any natural-history collections were made during this visit.

In 1772 an expedition consisting of two vessels, the "*Mascarin*" and the "*Marquis de Castries*," under the command of Marion du Fresne and Duclesmeur, arrived off Cape Egmont. Proceeding northwards, and failing to find a harbour, the ships rounded the North Cape, and eventually anchored in the Bay of Islands, where a stay of over two months was made. Marion and his people were welcomed with

such apparent cordiality by the Maoris that no suspicions of treacherous conduct were aroused. They were thus quite unprepared for the sudden attack which was made upon them, and which resulted, as is well known, in the massacre of Marion and nearly thirty of his crew. A graphic account of this unfortunate incident is given in the journal of Crozet, upon whom the command devolved after Marion's death. The same journal contains an excellent sketch of the natural productions of the country, in which many references are made to the vegetation; but, as in De Surville's expedition, no collections were made.

In 1824 the surveying corvette "Coquille," under the command of Captain Duperrey, arrived at the Bay of Islands, and remained for nearly a fortnight. Two naturalists were on board, Lieutenant D'Urville (afterwards Admiral D'Urville), an ardent botanical collector, and M. Lesson, both of whom made collections of some extent. In the beginning of 1827 D'Urville revisited New Zealand in command of the same vessel, renamed the "Astrolabe." He was again accompanied by Lesson, and also by Quoy and Gaimard as zoologists. First sighting the coast of the South Island near Greymouth, he proceeded northwards, and, rounding Cape Farewell, entered Cook Strait. A secure anchorage was found on the west side of Tasman Bay, between the mouth of the Motueka River and Separation Point, in which he remained for a week, forming important collections. He then crossed to the east side of Tasman Bay, and discovered the strait separating D'Urville Island from the mainland, known to this day as "the French Pass." Several days were occupied in surveying this passage, during which time both the botanical and zoological collections were added to. D'Urville then sailed through Cook Strait, and followed the east coast of the North Island to Tolaga Bay, where a brief stay was made. Continuing his voyage, he rounded the East Cape, crossed the Bay of Plenty, and, passing to the north of the Great Barrier Island, arrived at Whangarei Heads, where he remained for two or three days. Turning southwards, he passed Cape Rodney and Tiritiri Island, and anchored at the entrance to Auckland Harbour, of which little was known at that time. He landed on both the northern and southern banks of the Waitemata, and, having sent a boat up the Tamaki River as far as the present township of Otahuhu, some of his men were guided by the Maoris across the narrow isthmus to the head of the Manukau Harbour. D'Urville left Auckland Harbour by the Waiheke Channel, passed between the Great and Little Barrier Islands, and after a cruise to the North Cape returned to the Bay of Islands. On the 18th March he finally left New Zealand, having spent a little more than two months on its shores.

After the "Astrolabe" had returned to Europe the scientific results of the voyage were published in elaborate style under the auspices of the French Government. The botanical portion was undertaken by A. Richard, one of the leading botanists of his time,

and was issued in 1832, under the title of "*Essai d'une Flore de la Nouvelle Zélande*," accompanied by a folio atlas of plates. Richard included not only the species collected in the two expeditions of Duperrey and D'Urville, but also most of those obtained by Forster in Cook's second voyage. Altogether 380 species are enumerated, 211 of which are phænogams and 169 cryptogams, 51 of the latter being ferns. It is the first publication dealing with the flora of New Zealand as a whole, and possesses considerable merit, so much so that it is to be regretted that so little use of it has been made by New Zealand botanists.

Early in the nineteenth century a trading intercourse sprang up between the North Island and Sydney, and by degrees a small European settlement began to form at the Bay of Islands. This led to occasional visits from colonial botanists and explorers, and much additional information was thus obtained respecting the flora. In 1825 Mr. Charles Fraser, Government Botanist and Superintendent of the Sydney Botanical Gardens, landed for a day in the Bay of Islands, and made a small collection of plants. In 1826 his successor, the indefatigable Allan Cunningham, paid a visit of over five months' duration. Through the assistance afforded by the resident missionaries he was able to explore the greater part of the Bay of Islands district, and to visit Whangaroa and Hokianga, making extensive and valuable collections. In 1833 his brother, Richard Cunningham, arrived in H.M.S. "*Buffalo*," which had been sent to New Zealand by the Admiralty to obtain a cargo of kauri spars for experimental purposes. He also spent nearly five months in travelling through the Bay of Islands, Whangaroa, and Hokianga districts. In 1838 Allan Cunningham paid a second visit, remaining at the Bay of Islands through the whole of the winter and early spring; but the precarious state of his health prevented all active work, and his collections were consequently small. He returned to Australia in October, 1838, utterly exhausted and worn out, as his biographer says, "by twenty-five years of unwearyed exertions and laborious travel," and after lingering a few months, died at Sydney in June, 1839.

During a short visit to England, Allan Cunningham had prepared for publication a sketch of the Flora of New Zealand, entitled "*Floræ Insularum Novæ Zealandiæ Precursor; or, A Specimen of the Botany of the Islands of New Zealand*." The first part of this work appeared in the "*Companion to the Botanical Magazine*," Vol. ii.; the remaining portions in the "*Annals and Magazine of Natural History*," Vols. i. to iv. In it Cunningham enumerates the whole of the species published by Forster and A. Richard, including also some of Banks and Solander's plants which had been described by other botanists. To these he adds the new species discovered during his first visit and that of Richard Cunningham. Altogether the "*Precursor*" includes the names of 639 species, of which 394 are phænogams and 245 cryptogams. Although

containing much valuable information, it bears evident marks of hasty preparation, and can hardly be considered an adequate memorial of its enthusiastic and talented author. The herbarium of both the Cunninghams is now preserved at Kew.

Mr. J. C. Bidwill visited New Zealand for the first time in 1839, and after a short stay at the Bay of Islands proceeded to the Bay of Plenty, from whence he journeyed to Rotorua and Taupo. Crossing Lake Taupo he reached Lake Rotoaira; and, using the Native village there as a base of operations, succeeded in exploring the spurs of Tongariro and in ascending the cone of Ngauruhoe, being the first European to accomplish the feat. He returned by way of Rotorua, Tauranga, and the Thames Valley. His collections, which were forwarded to Sir W. J. Hooker, were the first made in the mountainous interior of the North Island, and contained several interesting discoveries, as *Veronica tetragona*, *Dacrydium luxifolium*, *Senecio Bidwillii*, *Dracophyllum recurvum*, &c. A few years later he visited the mountains of Nelson, forming a very interesting collection of mountain-plants, which were also forwarded to Sir W. J. Hooker.

In the years 1839-40-41, Dr. Ernest Dieffenbach made extensive travels in New Zealand as naturalist to the New Zealand Company. In addition to an examination of the whole of the northern peninsula, from the North Cape to Auckland, he travelled along the western coast to Raglan and Kawhia, and, crossing to the Waipa Valley, followed the western bank of the Waikato River to Lake Taupo. A project to ascend Tongariro and Ruapehu was frustrated by the opposition of the Maoris, and he returned to Auckland by way of Rotorua, Tauranga, and the Thames Valley. During another journey he explored a large part of the Taranaki District, and was the first European to ascend Mount Egmont. He also visited Wellington, Wanganui, and Kapiti Island, and spent some time in the exploration of Queen Charlotte Sound, Cloudy Bay, and the whaling-stations on the north-east coast of the South Island. Finally, he paid a visit to the Chatham Islands, and brought away the first plants collected in that outlying dependency of the colony. On his return to England Dieffenbach published his "Travels in New Zealand," the two volumes of which are replete with interesting matter relating to the flora, fauna, and Native inhabitants. His botanical collections were presented to the Kew Herbarium, but, according to Sir J. D. Hooker, they are "most scanty, compared with the great extent of interesting ground he passed over."

In July, 1840, the French corvette "L'Aube" arrived at the Bay of Islands, and after a brief stay proceeded to Akaroa, remaining there until November, 1841. In January, 1842, "L'Aube" was replaced by "L'Allier," which was stationed at Akaroa until January, 1843. The surgeon attached to these two vessels, M. E. Raoul, made excellent collections, mainly at Akaroa, and, as he was the first botanist to

investigate the flora of the eastern side of the South Island, many of his plants were altogether new. Raoul first of all published his discoveries in the "Annales des Sciences Naturelles" (Series III., Vol. ii.), but subsequently he prepared a work of wider scope under the name of "Choix de Plantes de la Nouvelle Zélande," illustrated with thirty beautiful plates. In it he reprints the descriptions previously published in the Annales, and gives an enumeration of the known species of the flora, including about 950 species, of which rather more than 500 are flowering-plants. But he accepted all Cunningham's species, many of which were not well founded, and also included no small number of synonyms and introduced plants. If these are eliminated, his list will be reduced to under 800. Raoul's services to New Zealand botany have been well commemorated in the genus *Raoulia*, dedicated to him by Sir J. D. Hooker.

In the year 1837 an elaborately organized expedition, consisting of the corvettes "Astrolabe" and "Zélée," under the command of Admiral D'Urville, was despatched by the French Government for the purpose of exploration in the Antarctic regions. The expedition visited the Auckland Islands during 1839, when M. Hombron, who acted as botanist, made a collection of plants, the first formed in the locality. The official record of the voyage, which appeared under the title of "Voyage au Pôle Sud et dans l'Océanie," contains a folio atlas of botanical plates prepared under the direction of M. Hombron, and two volumes of descriptive matter; one including the Cryptogamia, by Montaigne, the other the phænogams, by Decaisne. Drawings and descriptions were given of several species from the Auckland Islands; but all, or nearly all, had been already described in Hooker's *Flora Antarctica*, presently to be alluded to.

About the same period, the well-known American Exploring Expedition, under the command of Captain Wilkes, visited both the Bay of Islands and the Auckland Islands. Several naturalists were attached to the expedition, and collections of considerable importance were formed. After Wilkes's return, and after many delays, the botanical collections were intrusted to the eminent American botanist, Asa Gray. An account of the phænogams ultimately appeared (in 1854) in two volumes quarto, with a folio atlas of 100 plates. The number of New Zealand plants enumerated is not large, but Asa Gray's critical and descriptive remarks are in many cases of considerable value.

We now arrive at the Antarctic Expedition of Sir James Clark Ross, which left England in September, 1839, for the purpose of investigating the phenomena of terrestrial magnetism in high southern latitudes, and of prosecuting geographical discovery in the Antarctic regions. It consisted of two vessels, the "Erebus," commanded by Ross, and the "Terror," under Captain Crozier. To the first-mentioned vessel Dr. (now Sir J. D.) Hooker was attached as assistant surgeon and naturalist, whilst Dr. Lyall served in a similar capacity on the

“Terror.” After calling at the Cape of Good Hope, Kerguelen’s Island, and Tasmania, the expedition arrived at the Auckland Islands on the 20th November, 1840, remaining until the 12th December. On the 13th December it reached Campbell Island, leaving again on the 17th for a cruise to the Antarctic Circle and the south polar regions. Although the Auckland Islands had been visited by D’Urville and Wilkes during the previous year, nothing had been published respecting the vegetation, and with characteristic ardour Hooker devoted himself to its exploration. The luxuriance of the flora and the relatively large proportion of plants with brilliant and conspicuous flowers at once attracted attention. Hooker goes so far as to say, when writing of *Bulbinella Rossii*, “Perhaps no group of islands on the surface of the globe, of the same limited extent and so perfectly isolated, can boast of three such beautiful plants, peculiar to their flora, as the *Pleurophyllum speciosum*, *Celmisia vernicosa*, and the subject of the foregoing description.” Under such circumstances the scrutiny given to the vegetation was keen and almost exhaustive, as evidenced by the fact that but few additions have been made by later explorers. The first volume of the “Flora Antarctica,” prepared by Hooker after his return to England, and issued in 1844, is confined to the flora of the Auckland and Campbell Islands. It contains descriptions of 100 species of flowering-plants and twenty ferns and fern-allies, together with numerous mosses, *Hepaticæ*, and other cryptogams, and is illustrated with eighty beautifully prepared plates, fifty-six of which are of phænogams. Altogether, it is a splendid monument of painstaking exploration and research, and it seems almost incredible that the observations and material on which it is founded should have been collected in less than a month.

After the discovery of Victoria Land in the summer of 1840–41 Sir James Ross returned to Tasmania, proceeding from thence to the Bay of Islands, which was reached on the 14th August, 1841. Here the expedition remained until the 23rd November. During this period Sir J. D. Hooker was actively engaged in collecting materials for his projected “Flora of New Zealand,” receiving much assistance from Mr. Colenso and other residents. He remarks that his collections “contained no novelty amongst flowering-plants not known to Mr. Colenso and Dr. Sinclair, with whom I spent many happy days. Amongst cryptogamic plants I collected much that was then new, but most of the species have since been found elsewhere.”

With the departure of the Antarctic Expedition in 1841 the first period of botanical discovery in New Zealand—that of investigation by visitors from abroad—may be said to have closed; for, although several scientific expeditions, such as the “Novara,” “Challenger,” &c., have since visited the colony, they have done little in the way of botanical research. Since 1841 the advance which has been made is almost wholly due to the efforts of the colonists themselves.

The foremost place among resident botanists and explorers must be granted to the Rev. W. Colenso, both on account of the number and variety of his discoveries, and the ardour with which, for a period of no less than sixty-five years, he continued to observe and to collect facts and specimens in almost all branches of natural science, always giving the leading place to botany. Arriving in New Zealand in 1834, he was induced, first by the visit of the illustrious Darwin in the "Beagle" in 1835, and later by Allan Cunningham in 1838, to take up the study of the botany of his adopted country, forwarding his specimens from time to time to Sir W. J. Hooker at Kew. At first his collections were confined to the district between Whangarei and the North Cape, but he soon enlarged his field of operations. Space will not permit of a full account of his many journeys, which practically covered the whole length of the North Island, but the following were the most important. In 1841-42 he travelled on foot from Hicks Bay to Poverty Bay, and from thence inland through the rugged and almost inaccessible Urewera Country to Lake Waikaremoana, which he was the first European traveller to reach. He then crossed the Te Whaiti Mountains to Ruatahuna, from whence he proceeded to Rotorua and Tauranga. Striking inland again, he followed the upper Thames Valley to its head, and, crossing to the Waikato River, canoed a hundred miles down the river to its mouth. From thence he followed the west coast to the Kaipara Harbour, then again made for the east coast at Mangawai, finally reaching the Bay of Islands by way of Whangarei and Whangaruru. In 1843 he journeyed from Hicks Bay to Poverty Bay, and thence by sea to Castle Point. From that locality he proceeded to Ahuriri (Hawke's Bay) and the Wairoa River, which he ascended to Waikaremoana, returning by way of Rotorua and Tauranga. In 1844 he transferred his residence from the Bay of Islands to Hawke's Bay, and in the following year made his first expedition to the summit of the Ruahine Range, finding there a harvest of previously unknown alpine and subalpine plants. In 1847 he travelled by way of Titiokura and the Mohaka River to Taupo and Inland Patea, passing along the flanks of Tongariro and Ruapehu, and returning to Hawke's Bay over the Ruahine Range, which he was the first European to cross. These journeys and many others, all made on foot, with a few Native companions only, and often under circumstances of great privation and no little danger, are evidence of the ardour and enthusiasm with which Mr. Colenso carried on his botanical explorations in the early days of the colony. Nor did his zeal diminish with age, for the Transactions of the New Zealand Institute contain papers written by him describing plants collected during a journey made to the flanks of the Ruahine Range in his eighty-fifth year. In addition to numerous writings on the Maori race, on which he was for many years the chief authority, Mr. Colenso contributed no less than fifty-nine papers on botanical subjects to the Transactions

of the New Zealand Institute. Very few volumes, from the foundation of the Institute to the time of his death, are without a communication from his pen. It is true that in his later descriptive writings he adopted views as to the circumscription of species which are in conflict with those held by all other New Zealand botanists, and thus introduced a vast number of synonyms into the flora; but that is a circumstance which must not detract from the recognition of his undoubted services to the botany of New Zealand.

Dr. Andrew Sinclair was originally a surgeon in the Royal Navy, and first became known as a botanist from the collections he made while attached to the surveying expedition of H.M.S. "Sulphur" to the Pacific coasts of North and South America. He first visited New Zealand in 1841, during the stay of the Antarctic Expedition at the Bay of Islands, and accompanied Sir J. D. Hooker and Mr. Colenso in numerous botanical expeditions. Returning to Australia, he met with Captain Fitzroy, who was then on his way to New Zealand as Governor, and who engaged him as private secretary. Not long after his arrival in the colony he was appointed to the post of Colonial Secretary, which he retained for several years. His leisure time was almost entirely devoted to botanical pursuits, and he collected largely in most parts of the North Island, transmitting copious suites of specimens to Kew, where they constituted a large part of the material used by Hooker in the elaboration of the "*Flora Novæ Zealandiæ*." After the establishment of parliamentary government in New Zealand Dr. Sinclair vacated his position, and after a brief sojourn in England returned to New Zealand, with the intention of devoting himself to botanical work. After a short stay in Auckland he proceeded to Nelson, where he made important collections, adding many species to the alpine flora. He then repaired to Canterbury, and joined the late Sir Julius Haast in the geological and botanical survey then being made of the Southern Alps. There, in the year 1861, he was unfortunately drowned in an imprudent attempt to ford the Rangitata River. Although he never published anything of importance on New Zealand plants, his name will always be remembered as one of the pioneers of botanical discovery in the colony.

In the years 1847-51, H.M.S. "Acheron," under the command of Captain Stokes, was engaged in the survey of the coast-line of New Zealand, and especially of the western and south-western portions. Captain Stokes was accompanied as surgeon-naturalist by Dr. Lyall, who had served in a similar capacity in H.M.S. "Terror" in the Antarctic Expedition, and who made large collections, especially of Cryptogamia. Milford Sound, Chalky Inlet, Dusky Bay, Preservation Inlet, and both shores of Foveaux Strait were the chief localities botanized in by Lyall during this expedition. Among the plants collected were the first specimens of the magnificent *Ranunculus Lyalli*.

In 1853 there appeared the first volume, containing the flowering-plants, of Sir J. D. Hooker's "*Flora Novæ Zealandiæ*"; the second volume, including the cryptogams, following in 1855. The publication of this important work, in every way worthy of the reputation of its distinguished author, marked a new era in the history of the botany of New Zealand. For the first time the student was provided with an account of the flora characterized by aptness of description and accuracy of detail, and prepared by a botanist who had not only studied and collected a large proportion of the species in their native habitats, but whose position gave him ample opportunities of examining the material upon which the publications of his predecessors were founded. Under such advantages, the synonyms and false species incorrectly included by previous writers disappeared, and the flora assumed more of its real proportions and extent. Altogether, the "*Flora*" contains descriptions of 1,767 species, or more than double the number given in the last previous enumeration, that of Raoul in the "*Choix de Plantes*." Of the total number, 731 are flowering-plants and 119 ferns or fern-allies, the remainder falling into other orders of Cryptogamia. The value of the work is much enhanced by the 130 carefully prepared plates which accompany it, and by the philosophic Introductory Essay dealing with the affinities and distribution of the species.

The eleven years subsequent to the publication of the "*Flora*" formed a period of great activity in botanical research in the colony. This was mainly due to the rapid settlement of the South Island, which led to the exploration of the central range of mountains, from Nelson to Otago, and the consequent discovery of the rich alpine flora existing thereon. The earliest worker in this field was Sir D. Monro, the first of whose contributions was received at Kew while the "*Flora*" was in progress. He explored a large part of north-eastern Nelson and Marlborough, making many capital discoveries, such as the magnificent *Olearia insignis*, *Helichrysum coralloides*, *Celmisia Monroi*, *Senecio Monroi*, &c. His sole publication, so far as I can learn, is an interesting essay on the Geographical Botany of Nelson and Marlborough, printed in the first volume of the Transactions of the New Zealand Institute.

Mr. W. T. L. Travers arrived in Nelson in 1849. About 1854 he took up the study of the alpine flora of the South Island, making many excursions into remote and little-explored districts, and forming copious collections, the whole of which were forwarded to Kew. Among the localities botanized over by him were the upper Buller Valley, including Lakes Rotoiti and Rotoroa; the whole of the Wairau Valley, from the mouth of the river to its sources in the rugged Spenser Mountains; the upper Clarence Valley, with its tributaries; the Waiau and Hurunui Valleys, with the adjacent mountains; also the Canterbury Plains and various parts of Banks Peninsula. His discoveries

included many singular and prominent species, and the genus *Traversia* (now reduced to *Senecio*) was named in his honour by Sir J. D. Hooker. He contributed many papers and addresses more or less relating to the botany of the colony to the Transactions of the New Zealand Institute, and was an earnest and assiduous supporter of botanical research up to the time of his death in 1903.

The well-known geologist and explorer Sir Julius Haast first landed at Auckland in 1858. Meeting Dr. Hochstetter, the geologist to the "Novara" expedition, he travelled with him through the greater part of the interior of the North Island, subsequently visiting portions of the Nelson District. After Hochstetter's departure, he accepted an engagement from the Nelson Provincial Government to explore the western and southern portions of the province, a work which occupied the greater portion of 1860, and during which he became familiar with the alpine vegetation of that part of the colony. In the following year he was appointed geologist for the Province of Canterbury, and at once commenced a series of expeditions into the then little-known Southern Alps for the purpose of studying their geology and physical structure, and of forming botanical and zoological collections. The botanical results, with which we are alone concerned, proved to be most important, and cast a flood of light on the nature and distribution of the alpine flora of the colony. I quite concur with Sir J. D. Hooker's opinion that it is difficult to imagine how Sir Julius Haast, with so many and such arduous duties as surveyor and geologist, could have personally effected so much for botany as he has done. Most of his botanical work was performed in the years between 1860 and 1870, but his interest in the subject remained undiminished until his death in 1887. His name is appropriately commemorated in the genus *Haastia*, the three or four species of which rank amongst the most curious and remarkable in the flora. His collections were either forwarded to Kew or distributed among European museums, but few being retained in the colony.

Dr. Lauder Lindsay, a well-known British botanist, visited New Zealand in the summer of 1861-62, and spent nearly four months in investigating the botany of eastern Otago, the district examined stretching from Dunedin to the mouth of the Clutha River, and inland to Tuapeka. The results of his journey were published in 1868 under the title of "Contributions to New Zealand Botany," with four coloured plates. Dr. Lindsay gives the total number of species collected at 612, of which 199 were phænogams and 413 cryptogams. The memoir contains much information of value, the critical notes in particular being copious and interesting.

Mr. John Buchanan arrived in New Zealand prior to 1860, taking up his residence in Dunedin. He at once commenced an assiduous study of the native vegetation, making many important discoveries and collecting large suites of specimens. In 1862 he accepted the

appointment of draughtsman and botanist to the Geological Survey of Otago, then being organized by Dr. (now Sir James) Hector. In the two or three years immediately following he accompanied Sir James Hector in a succession of adventurous journeys, during which a great part of central and western Otago was visited and explored. The collections made, which were mostly forwarded to Kew, contained many interesting and remarkable discoveries, among which may be mentioned *Ranunculus Buchanani*, *Pachycladon novæ-zealandicæ*, *Hectorella cæspitosa*, *Azorella exigua*, *Celmisia ramulosa*, *Veronica Buchanani*, &c. In 1865 Mr. Buchanan prepared his "Sketch of the Botany of Otago," the first local Flora issued in the colony, and a work of considerable merit, evidencing much industrious research. It was written at the request of the Commissioners of the New Zealand Exhibition of 1865, but was not actually published until 1869, when it appeared in the first volume of the Transactions of the New Zealand Institute. On the establishment of the Geological Survey of New Zealand in 1866 he was appointed draughtsman and botanist, and removed to Wellington. He was successively engaged in botanical explorations of the North Auckland Peninsula, the Kaikoura Mountains, and Mount Egmont, some interesting notes on the two last-mentioned districts being printed in Vol. x. of the Journal of the Linnean Society. In 1873 he published a valuable paper on the flora of the Wellington Provincial District; followed in 1874 by his "Flowering-plants and Ferns of the Chatham Islands," based on the collections made by Mr. H. H. Travers in 1863 and 1871. His most important work, published in 1880, is the "Indigenous Grasses of New Zealand," a folio volume of nearly two hundred pages, illustrated with sixty-four lithographic plates. It contains descriptions of the whole of the species then known to inhabit New Zealand, together with notes on their economic value, distribution, &c. Mr. Buchanan's contributions to New Zealand botany include forty separate papers, stretching through twenty volumes of the Transactions of the New Zealand Institute. His last communication appeared in 1887, after which persistent ill health compelled him to give up botanical work. His death took place in 1898. His earlier collections were mostly forwarded to Kew, but in later years he formed an extensive herbarium for the Colonial Museum. His private collections, drawings and analyses, manuscript notes, &c., were bequeathed to the Otago University Museum.

No account of the history of botanical discovery in New Zealand would be complete without reference to the labours of Sir James Hector, the first Director of the Geological Survey and Manager of the New Zealand Institute. Arriving in the colony in 1861, his first duty was a geological and topographical exploration of the Province of Otago, a work which at that time involved many difficulties and hardships, and no small amount of danger. As previously mentioned, he obtained the services of Mr. Buchanan as collector and artist;

but his own share in the work of botanical exploration was by no means small. That he fully grasped the leading features of plant-distribution in the South Island is evidenced by his essay "On the Geographical Botany of New Zealand," printed in the first volume of the Transactions of the New Zealand Institute. After his removal to Wellington in 1866, the official duties appertaining to the Geological Survey and Colonial Museum, &c., left little time for botanical research; but he has never missed an opportunity of promoting the efforts of others. In fact, it can be said that from the time of his arrival in the colony up to the present day no attempt has been made to investigate its flora which has not had his countenance and support. His services to botanical science are fitly commemorated in the remarkable endemic genus *Hectorella*, and in the magnificent *Senecio Hectori*, one of the finest of the arborescent *Compositæ* of the colony.

In 1863 Mr. H. H. Travers visited the Chatham Islands for the purpose of investigating its flora, at that time only known from a few plants collected by Dr. E. Dieffenbach in 1840. He remained in the group for several months, and succeeded in forming large collections. On his return these were placed in the hands of the late Baron Mueller, of Melbourne, who published the results in his "Vegetation of the Chatham Islands," issued in 1864. In it Baron Mueller enumerates 129 species, of which sixty-two are phænogams and sixty-seven cryptogams. Seven new species were described. The work forms an important addition to the botanical literature of the colony, but New Zealand botanists entirely repudiate the peculiar views entertained by the author respecting the circumscription of many of the species. For instance, he merges the whole of the species of *Veronica* found in the Chathams, together with thirteen others from New Zealand, into one collective species, to which he gives the new name of *V. Forsteri*. An excellent account of Mr. Travers's visit was contributed by himself to the first volume of the Transactions of the New Zealand Institute. In 1871 he again visited the group, adding largely to his previous list. On this occasion his collections were worked out by Mr. Buchanan in his paper on "The Flowering-plants and Ferns of the Chatham Islands." Mr. H. H. Travers has also made collections on the Tararua Mountains, the Nelson mountains, and in other localities.

The important discoveries made in the interior of the South Island during the ten years following the publication of the "Flora Novæ Zealandiæ," and the increasing demand for a concise and inexpensive account of the plants of the colony, induced the New Zealand Government to make arrangements with Sir J. D. Hooker for the publication of such a work. The first part, containing the flowering-plants and ferns, appeared in 1864, under the title of "Handbook of the New Zealand Flora"; the concluding part, comprising the mosses, *Hepaticæ*, and lower cryptogams, followed in 1867. Its publication at once showed the great advance which had been made in elucidating the

flora. The 731 species of flowering-plants and 119 ferns known in 1853 were increased to 935 and 135 respectively, an increase of nearly one-quarter; while the additional information obtained with regard to the distribution of the species was correspondingly large. The general plan of the work was in accordance with that recommended by Sir W. J. Hooker for a uniform series of floras of the British Colonies, a project which has been to a considerable extent carried out. In point of execution, the "Handbook" realised all the expectations which could have been entertained. The clearness and excellence of the descriptions and their general accuracy are most noteworthy, especially when it is considered that a large proportion of the species have been examined and described by the author alone. Its publication gave an immense impetus to the study of the indigenous vegetation, and it must always remain the foundation for future systematic work on the botany of the colony.

The number of persons who have collected plants or published memoirs relating to New Zealand botany during the forty years which have elapsed since the publication of the "Handbook" is so large that I can only allude to the chief workers here. The first place must be accorded to Mr. T. Kirk, both from the number of his discoveries and the importance of his publications. Arriving in the colony in 1863, he at once devoted himself to its botany, his first discoveries being briefly mentioned in the appendix to the second part of the "Handbook." For ten years after his arrival he resided in Auckland, his chief explorations during that period being that of the Great Barrier Island in 1867, of the north-eastern coast of the northern peninsula in 1868, of the Thames Goldfields in 1869, of the Waikato district in 1870, and of the Rotorua and Taupo districts in 1872. Among the numerous species added to the flora by these journeys are the following: *Pittosporum Kirkii*, *Pseudopanax discolor*, *Coprosma arborea*, *Olearia Allomii*, *Dacrydium Kirkii*, *Phyllocladus glauca*, and *Isoetes Kirkii*. In 1874 Mr. Kirk removed to Wellington, occupying firstly the position of Lecturer on Natural Science at Wellington College, and at a later date that of Chief Conservator of State Forests. In the performance of the duties of the latter office he travelled through the greater part of both the North and South Islands, and these journeys were always employed to the furtherance of botanical science. After his retirement from the State Forests Department he made a lengthened exploration of Stewart Island, detecting several novelties, among them the superb *Olearia Traillii*. In 1890 he paid a visit to the Auckland and Campbell Islands, adding several species to their flora. During the same voyage he landed on the Snares and Antipodes Islands, the vegetation of which was previously quite unknown. The results of this expedition were embodied in a memoir printed in the Report of the Australasian Association for 1891. Mr. Kirk was a voluminous writer, and his contributions to New Zealand botany, mostly printed

in the Transactions of the New Zealand Institute, number nearly a hundred and fifty. His most important completed work is "The Forest Flora of New Zealand," issued in 1889. Its primary object was to diffuse a knowledge of the forest resources of the colony and to describe the chief methods of timber working and conversion. It contains much information on the economic value and uses of the New Zealand timbers, together with descriptions of the species, and is illustrated with 150 plates. In 1894 he was commissioned by the New Zealand Government to prepare a Flora of the colony, a work for which he had long been collecting material, and for which his wide personal knowledge of the vegetation of the country gave him exceptional qualifications. He entered upon the work with characteristic energy and ardour; but, unfortunately, his health gradually failed, and after several serious illnesses he died in March, 1897. That portion of his work which was in a sufficiently complete state at the time of his death, comprising the *Polypetalæ*, and the *Monopetalæ* as far as the *Compositæ*, was issued from the Government Printing Press in 1899. Although printed without the advantage of the author's supervision, and without the introductory and supplementary matter usually given in such publications, it shows very clearly the loss which botanical science has suffered through his decease, and all students will regret that he did not live to complete the work for which he had made so many preparations.

I do not propose to say anything in regard to my own researches into the flora, beyond stating that they have extended continuously from the year 1870 to the present time, and include an examination of almost the whole colony, from the Kermadec Islands and the North Cape to Otago. A list of my papers on botanical subjects will be found in Mr. Hamilton's Bibliography, printed in Vol. xxxvi. of the Transactions of the New Zealand Institute (pp. 342-72).

In the years 1874 and 1875 Dr. Sven Berggren, of the University of Lund, Sweden, made an extended visit to New Zealand, travelling through the greater portion of both Islands, and making large collections, especially of cryptogams. The new species of flowering-plants were described and beautifully illustrated in a memoir published in 1877 in the Proceedings of the University of Lund. The *Algæ* have been worked out by Dr. Nordstedt and the late Professor J. G. Agardh, while scattered memoirs relating to other orders of cryptogams have been published from time to time by Dr. Berggren himself.

From 1875 to the present time many important contributions to our knowledge of the flora of the colony have been made by Mr. D. Petrie, formerly Chief Inspector of Schools for Otago, and now holding a similar position in Auckland. During a residence of more than twenty years in Otago he sedulously investigated the vegetation of the eastern, central, and southern portions of the province, ascending many of the mountains, and forming large collections, especially

of the rarer alpine and subalpine plants. Among the species added by him to the flora are *Ranunculus Berggreni*, *Carmichaelia compacta* and *C. Petriei*, *Coprosma virescens* and *C. Petriei*, *Olearia fragrantissima*, *Celmisia prorepens* and *C. Petriei*, *Myosotis Goyeni*, *Tetrachondra Hamiltoni*, *Veronica Petriei*, *Ourisia prorepens*, &c. In company with Mr. G. M. Thomson, he also visited Stewart Island, making several discoveries of interest, as *Actinotus bellidioides*, *Liparophyllum Gunnii*, *Carex longiculmis*, and *Ehrharta Thomsoni*. In 1895 Mr. Petrie published his "List of Flowering-plants indigenous to Otago," in which he catalogues the whole of the species, numbering over 760, observed by himself in Otago, giving at the same time particulars respecting the geographical and altitudinal range of the species. Altogether forty-four papers on botanical subjects are credited to Mr. Petrie in Mr. Hamilton's bibliography of New Zealand botanical literature.

Mr. G. M. Thomson, of Dunedin, has also done excellent service towards the elucidation of the botany of Otago. As already mentioned, he accompanied Mr. Petrie in an exploration of Stewart Island, and has collected largely in the vicinity of Dunedin. Several papers on Otago plants have been contributed by him to the Transactions of the New Zealand Institute; but probably the most interesting of his publications are two memoirs "On the Means of Fertilisation among some New Zealand Orchids" (Trans. N.Z. Inst., xi., 418) and "On the Fertilisation of New Zealand Plants" (*Ibidem*, xiii., 241). His work on the "Ferns and Fern-allies of New Zealand," issued in 1882, is an accurate and useful compendium, containing descriptions of all the known species. He is also the author of an "Introductory Class-book of Botany," which has been largely used in New Zealand schools.

Mr. J. F. Armstrong, for many years resident in Christchurch, has collected largely in the Province of Canterbury, and has published several papers of value. Among them are his "Sketch of the Flora of the Province of Canterbury" (Trans. N.Z. Inst., xii., 325) and "Synopsis of the New Zealand Species of Veronica" (*Ibidem*, xiii. 344), the latter publication containing descriptions of several new species. He also founded the genus *Corallospartium* for the reception of the remarkable plant first described by Sir J. D. Hooker under the name of *Carmichaelia crassicaulis*.

The Right Rev. W. L. Williams, Bishop of Waiapu, has for thirty years given special attention to the botany of the East Cape and Hawke's Bay Districts, carefully noting the chief features of the vegetation, and collecting copiously. Among his discoveries may be mentioned the remarkable *Carmichaelia Williamsii*, one of the most local plants in the colony. Mr. Kirk's paper on the Botany of the East Cape District (Trans. N.Z. Inst., xxix., 509) is largely founded on Bishop Williams's specimens and notes. The collection of Maori

plant-names is also a subject to which he has devoted much time and labour, and the list appended to this work is in great measure due to his friendly co-operation.

Mr. A. Hamilton, the present Director of the Colonial Museum, made an interesting collection of plants at Okarito in 1878, which included several novelties. Among them was the remarkable species described by Hooker as *Euphrasia disperma*, which has since been taken by Wettstein as the type of his genus *Anagosperra*. At a later date he botanized in the Hawke's Bay District, along the flanks of the Ruahine Range, and elsewhere on the eastern side of the North Island. In 1894 he visited Macquarie Island, and, although much hindered by exceptionally severe weather and other untoward circumstances, succeeded in adding considerably to our knowledge of the botany of the island. A list of the plants collected will be found in his "Notes on a Visit to Macquarie Island" (Trans. N.Z. Inst., xxvii., 559).

Mr. H. Hill, of Napier, has also collected largely in the Hawke's Bay and East Cape districts. Many of his specimens were communicated to Mr. Colenso, and were described by that gentleman as new species. He was the first to find the widely distributed *Peperomia reflexa* in the colony, and to rediscover the plant to which the name of *Veronica Colensoi* was originally applied by Hooker.

Mr. J. D. Enys, for several years resident at Castle Hill, in the middle portion of the Waimakariri basin, and a keen observer in many branches of natural science, made large collections in the Canterbury Alps in the years between 1874 and 1890. Among his discoveries may be mentioned *Ranunculus Enysii* and *R. paucifolius*, *Carmichaelia Enysii*, *Ligusticum Enysii*, *Botrychium lunaria*, &c. He also paid a visit to the Chatham Islands, bringing back a few interesting plants, among which were the first specimens of the endemic *Sonchus grandifolius*. His collections were for the most part communicated either to Mr. Kirk or myself.

Mr. James Adams, of Thames, has botanized in several parts of both the North and South Islands, making several interesting discoveries, the chief of which are *Celmisia Adamsii*, *Loranthus Adamsii*, and *Myosotis amabilis*. His papers on the Botany of Te Aroha Mountain (Trans. N.Z. Inst., xvii., 275); on the Botany of Te Moehau (*Ibid.*, xxi., 32); and the Botany of Hikurangi Mountain (*Ibid.*, xxx., 414); contain much interesting matter bearing on the distribution of the New Zealand flora.

Mr. F. R. Chapman (now Mr. Justice Chapman) has collected in Otago, and in 1890 visited the Auckland Islands and other islands to the south of New Zealand. His paper on "The Outlying Islands South of New Zealand" contains much valuable information of a botanical nature. He has also published two papers containing descriptions of certain new species of *Celmisia* (Trans. N.Z. Inst., xxii., 444; and xxiii., 407).

Professor J. H. Scott, of Dunedin, visited Macquarie Island in 1880. On his return he published an excellent account of the fauna and flora (Trans. N.Z. Inst., xv., 484), including a catalogue of the plants observed by him.

Among others who have interested themselves with New Zealand botany between the publication of the "Handbook" and the year 1895 may be mentioned the late Mr. Justice Gillies, Captain Hutton, T. H. Potts, C. Traill, S. Percy Smith, J. Rutland, P. Goyen, Captain G. Mair, A. T. Urquhart, H. Tryon, Archdeacon Walsh, T. W. Kirk, J. W. Hall, J. Tennant, and J. Baber.

In 1896 Dr. L. Diels, of Berlin, published in Engler's Botanical Year-book a paper entitled "Vegetations-biologie von Neu-Seeland," which deserves special mention on account of being the first attempt to prepare an account of the flora of the colony from an oecological standpoint. Although based entirely on herbarium material and on the observations of other botanists and collectors, and consequently containing errors both of omission and commission, it is nevertheless a work of considerable originality and merit, and is well worth the attention of all students of the flora.

Since 1897 by far the most important contributions to our knowledge of the New Zealand flora have been made by Dr. L. Cockayne, and I regret that only brief mention can be made of his work here. In three papers "On the Seedling Forms of New Zealand Phanerogams and their Development" (Trans. N.Z. Inst., xxxi., 354; xxxii., 83; and xxxiii., 264) he describes with considerable detail the seedling leaves of many New Zealand plants, giving numerous figures, and in several instances tracing the gradual development of the foliage into the mature stage. Much information is given respecting the life-history of the species treated of, particularly in the genera *Carmichaelia* and *Veronica*. In the latter genus, most of the species with scale-like leaves are very fully discussed, and their early foliage described. In a paper on the "Plant-geography of the Waimakariri River-basin" (Trans. N.Z. Inst., xxxii., 95) Dr. Cockayne makes the first attempt in the colony to treat the flora of a district from an oecological point of view. It was followed by his "Account of the Plant-covering of Chatham Island" (Trans. N.Z. Inst., xxxiv., 242), a publication which has thrown a flood of light on the nature and composition of the flora of this seldom-visited appanage of New Zealand. Lastly, the volume of Transactions for 1904 contains an elaborate paper on "An Excursion to the Southern Islands of New Zealand," in which he not only gives a detailed account of the "plant-formations" which make up the flora of the islands visited, but also contributes a list of the flowering-plants and ferns, and a sketch of the physiography, geology, climate, &c. These papers, which mark an entirely new epoch in the history of botanical investigation in New Zealand, will induce all students of the flora to look forward with impatience for the appearance of the

general work on the plant-geography of New Zealand which it is understood that Dr. Cockayne has in preparation.

The very important researches made by Professor A. P. W. Thomas into the life-history of *Phylloglossum*, summarised in his "Preliminary Account of the Prothallium of *Phylloglossum*" (Proc. Roy. Soc., Vol. lxi., pp. 285-91) deserve special mention; as also his suggestive paper on "The Affinity of *Tmesipteris* with the *Sphenophyllales*" (*Ibid.*, p. 343-50). The more detailed information promised with respect to both these communications will be eagerly looked forward to by New Zealand botanists.

During the last five years, Mr. W. Townson, of Westport, has diligently explored the greater portion of south-western Nelson, from the Mokihinui River southwards to the Grey River, repeatedly ascending all the higher peaks of the coast ranges, as Mount Frederic, Mount Rochfort, Mount William, Mount Faraday, Mount Buckland, &c. He has also visited the Lyell Mountains, and many of the high peaks flanking the Buller Valley, as far up the river as Mount Murchison and Mount Owen. Most of this large district had never been carefully examined for plants, and Mr. Townson has consequently reaped a rich harvest of novelties, most of which are described in this work. Among them are *Aciphylla Townsoni*, *Celmisia dubia*, *Dracophyllum Townsoni* and *D. pubescens*, *Gentiana Townsoni*, *Veronica divergens* and *V. coarctata*, and the interesting new genus of *Orchideæ* which I have named in his honour *Townsonia*. Mr. Townson's specimens, which have been collected with great care and judgment, have been mainly forwarded to me for the purposes of this work, and have proved of much service in determining many questions relating to the geographical range of the species.

Mr. H. J. Matthews, the present head of the Forestry Department, has collected in many parts of the colony, adding largely to our knowledge of the range of the species, and obtaining a few novelties, notably the beautiful *Ranunculus Matthewsii*, described in the appendix to this work. He has also done excellent service in forming an extensive collection of living plants in his garden at Dunedin, especially of the rarer alpine and subalpine species. If this collection is maintained and extended, it will prove invaluable for affording the means of leisurely study and comparison in difficult genera like *Veronica* and *Celmisia*, &c.

Mr. F. G. Gibbs, of Nelson, has done excellent work during the last ten years in the Nelson District, both on the Dun Mountain Range and on the chain of mountains extending northwards from Mount Arthur to Collingwood. Among his special discoveries are the curious *Veronica Gibbsii*, *Gentiana vernicosa*, *Celmisia Gibbsii*, &c.

The Marlborough District has been carefully and closely examined by Mr. J. H. Macmahon, who has made several finds of importance, especially in the neighbourhood of Mount Stokes, *Celmisia Mac-*

mahoni, *C. Rutlandii*, and *Veronica rigidula* are interesting novelties first observed by him.

Mr. R. H. Matthews, of Kaitaia, has assiduously collected in most parts of Mongonui County, paying special attention to the *Orchideæ*. He has added *Corysanthes Matthewsii* and *Chiloglottis formicifera* to the flora, and has succeeded in refinding *Pittosporum obcordatum*, which for sixty years after its original discovery by Raoul had eluded the search of New Zealand botanists.

Mr. H. Carse, now resident in Mongonui County, has botanized in several portions of the Auckland Provincial District. He has given special attention to the *Cyperaceæ*, adding *Schænus Carsei* and *Lepidosperma filiforme* to the list of those already known to occur in the colony. He was also the first to observe the curious little plant which I have provisionally described under the name of *Trithuria inconspicua*.

For several years Mr. F. A. D. Cox has carefully investigated the flora of the Chatham Islands, obtaining much new information relating to the distribution and environment of the species, and collecting a few novelties. His specimens, often accompanied by valuable notes, have been forwarded to Mr. Kirk, Dr. Cockayne, and myself.

Other recent workers are R. Helms, R. J. Kingsley, J. Dall, D. W. Bryant, Elsdon Best, E. W. Andrews, J. B. Simpson, H. Nairn, J. R. Annabell, J. B. Lee, and T. P. Arnold.

In the preceding sketch I have made no attempt to include the names of those authors who have published general works or special monographs in which New Zealand plants are casually mentioned or described. Nor have I mentioned the labours of those who have attended solely to the lower cryptogams, a branch of the flora which is outside the scope of the present work.

MANUAL

OF THE

NEW ZEALAND FLORA.

ORDER I. **RANUNCULACEÆ.**

ANNUAL or perennial herbs, rarely shrubs or woody climbers. Leaves all radical or alternate, seldom opposite (*Clematis*). Stipules wanting, or adnate to the petiole. Flowers regular or irregular, hermaphrodite or more rarely unisexual. Sepals 3 or more, usually 5, deciduous, often petaloid, imbricate (valvate in *Clematis*). Petals the same number as the sepals or more, hypogynous, free, imbricate, sometimes wanting. Stamens hypogynous, usually very numerous; anthers adnate. Carpels generally many, free, 1-celled; ovules one or several, attached to the ventral suture, anatropous. Fruit of numerous 1-seeded indehiscent achenes or many-seeded follicles, rarely a berry. Seeds small; embryo minute, at the base of copious albumen.

A large order, most abundant in temperate regions; rare within the tropics. Genera 30; species about 550. Most of the species are acrid, and many are poisonous, *Aconite* and *Hellebore* being familiar examples. All the New Zealand genera are widely distributed in temperate climates.

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|---|----------------|
| Woody climbers with opposite compound leaves. Sepals petaloid, valvate. Petals wanting | 1. CLEMATIS. |
| Minute herbs with radical linear leaves. Petals wanting. Carpels with a single pendulous ovule. Achenes in an elongated spike | 2. MYOSURUS. |
| Herbs. Sepals deciduous. Petals 3 to many. Carpels with a single erect ovule | 3. RANUNCULUS. |
| Herbs with radical sagittate leaves. Sepals petaloid. Petals wanting. Carpels with several ovules | 4. CALTHA. |

1. **CLEMATIS**, Linn.

Climbing undershrubs with slender flexuous branches, rarely dwarf and prostrate. Leaves opposite, usually ternately divided into 3 stalked leaflets, which are either entire or more often variously lobed or cut; petioles often twining. Flowers in few- or many-flowered axillary panicles, dioecious in the New Zealand species. Sepals 4–8, petaloid, valvate in the bud. Petals wanting.

Stamens many. Carpels numerous, each with one pendulous ovule. Fruit a head of sessile achenes, in all the New Zealand species produced into long feathery persistent styles.

A genus of over 100 species, found in most temperate climates, rare in the tropics. The New Zealand species are all endemic, and all possess once- or twice-ternately divided leaves and diœcious flowers, the males without any carpels, the females usually with a few imperfect stamens. Most of them vary greatly in the foliage, especially the large-leaved species. These in their normal state have 3-foliolate leaves with the leaflets toothed or lobed, but all run into varieties in which the leaves are biternate or decomposed, the ultimate segments being much reduced in size. These forms are most difficult of discrimination, especially when in a flowerless condition, and some of them are probably not permanent states.

A. Sepals white.

- Large and stout. Leaflets usually entire. Flowers 2-4 in. diam. .. 1. *C. indivisa*.
 Slender, pale-green. Leaflets toothed or lobed. Flowers 1-1½ in. diam. .. 2. *C. hexasepala*.
 Small, slender. Leaflets pinnate or pinnately divided. Flowers ½-1 in. diam. .. 3. *C. australis*.

B. Sepals yellowish or greenish-yellow (purplish in C. quadribacteolata).

* Sepals usually 6 (5-8). Leaflets usually large and well developed.

- Slender. Leaflets glabrous or nearly so, toothed or lobed. Flowers greenish-yellow. Sepals silky .. 4. *C. Colensoi*.
 Stout. Leaflets coriaceous, pubescent, toothed or lobed. Flowers yellow. Sepals densely tomentose .. 5. *C. fœtida*.
 Slender. Leaflets thin, silky-pubescent, often entire. Flowers yellow. Sepals silky. Anthers broad, tipped with a minute appendage .. 6. *C. parviflora*

** Sepals 4. Leaflets minute, wanting in *C. afoliata*.

- Usually leafless. Flowers greenish-white, ½-¾ in. diam. .. 7. *C. afoliata*.
 Slender, brownish-green. Leaflets minute, ⅓-½ in. long, entire or toothed. Flowers yellow, ½ in. diam. .. 8. *C. marata*.
 Very slender. Leaflets minute, usually linear. Flowers purplish, ⅓-½ in. diam. Sepals narrow-linear .. 9. *C. quadribacteolata*.

1. *C. indivisa*, Willd. *Sp. Plant.* ii. 1291.—A large woody climber, often covering bushes or small trees. Stem stout, frequently as thick as a man's arm. Leaves 3-foliolate, coriaceous, glabrous; leaflets 1-4 in. long, all stalked, ovate-oblong or ovate-cordate, rarely narrower and linear-oblong, usually entire. Flowers in axillary panicles, most abundantly produced, large, white, 2-4 in. diam. Sepals 6-8, oblong. Anthers oblong, obtuse. Achenes numerous, downy, with a plumose tail often more than 2 in. long.—*A. Rich. Fl. Nouv. Zel.* 288; *A. Cunn. Precur.* n. 635; *Raoul, Choix*, 47; *Hook. f. Fl. Nov. Zel.* i. 6; *Handb. N.Z. Fl.* 2; *Kirk, Students' Fl.* 2; *Hook. Bot. Mag.* t. 4398 (a form with the leaflets lobed). *C. integrifolia*, *Forst. Prodr.* n. 231.

Var. *lobulata*, *Kirk, Students' Fl.* 2.—Leaflets lobed or even twice ternate.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Sea-level to 2500 ft. *Puawhananga*. August-November.

A variable plant, but easily recognised by its great size and large showy white flowers. The leaves are usually entire, but are occasionally lobulate, especially in young plants. Mr. Kirk's variety *linearis*, which has narrow-linear leaves, 4-6 in. long by barely $\frac{1}{2}$ in. broad, appears to me to be only a transient juvenile form.

2. *C. hexasepala*, D.C. *Syst.* i. 146.—Much smaller and more slender than *C. indivisa*. Leaves 3-foliolate, pale-green, coriaceous, glabrous; leaflets 1-3 in. long, stalked, narrow ovate-oblong or ovate-cordate, acute or acuminate, usually irregularly toothed or lobed, rarely entire. Flowers numerous, 1-1 $\frac{1}{2}$ in. diam., white. Sepals 6-8, linear-oblong, obtuse, downy. Anthers long, linear, obtuse. Achenes numerous, narrow-ovoid, pilose.—*A. Cunn. Precur.* n. 637; *Raoul, Choix*, 47; *Hook. f. Handb. N.Z. Fl.* 2; *Kirk, Students' Fl.* 3. *C. hexapetala*, *Forst. Prodr.* n. 230; *A. Rich. Fl. Nouv. Zel.* 288. *C. Forsteri*, *Gmel. Syst.* 873. *C. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 6, t. 1 (not of *Handb. N.Z. Fl.*).

NORTH ISLAND: From the Kaipara Harbour to Cook Strait; not uncommon, especially in the Upper Waikato and Taupo districts. SOUTH ISLAND: Queen Charlotte Sound, *Forster*; near Moutere (Nelson), *T. F. C.* Recorded from Canterbury (*Armstrong*), Otago (*Lindsay*), and the Bluff Hill (*Kirk*). *Pikieraro*. September–November.

Easily separated from *C. indivisa* by the smaller size, narrower pale-green leaves, which are almost always toothed, and by the smaller flowers.

3. *C. australis*, *T. Kirk, Students' Fl.* 3.—Stems and branches slender, much branched, glabrous or pubescent at the tips. Leaves 3-foliolate, glabrous, somewhat coriaceous (especially in the small-leaved forms); leaflets very variable in size, $\frac{1}{3}$ -1 in. long, pinnate or pinnately lobed, segments or lobes usually again toothed or lobed. Flowers white, $\frac{1}{2}$ -1 in. diam., in few-flowered panicles or solitary on long slender peduncles clustered in the axils of the leaves. Sepals 5-8, downy. Achenes narrowed into the style, usually pilose, sometimes glabrous when fully mature.

SOUTH ISLAND: Hilly and mountain districts in Nelson and Canterbury, not uncommon. 500-3500 ft. November–January.

A puzzling plant, large states of which can only be separated from *C. hexasepala* by the pinnately divided leaflets, while smaller forms come very nearly to *C. Colensoi* var. *rutaefolia*, from which, however, it can usually be distinguished by the larger white flowers and more pointed sepals.

4. *C. Colensoi*, *Hook. f. Handb. N.Z. Fl.* 2.—Stems and branches slender, glabrous or silky at the tips. Leaves 3-foliolate, membranous or slightly coriaceous; leaflets stalked, $\frac{1}{3}$ -1 $\frac{1}{4}$ in. long, crenate, unequally toothed or 3-lobed, or again ternately or pinnately divided. Flowers greenish-yellow, $\frac{1}{2}$ -1 in. diam., in few- or many-flowered panicles, or more usually solitary on slender peduncles fascicled in the axils of the leaves. Sepals 5-8, oblong, silky. Anthers linear. Achenes silky or sometimes nearly glabrous when mature.—*Kirk, Students' Fl.* 3. *C. hexasepala*, *Hook. f. Fl. Nov. Zel.* i. 7 (not of D.C.).

Var. *rutaefolia*, Hook. f. *Fl. Nov. Zel.* i. 7.—Leaves biternate or bipinnate; secondary leaflets often stalked. Usually smaller than the type.

NORTH ISLAND: Both varieties common about Wellington, and extending northward to Hawke's Bay and Cape Egmont. SOUTH ISLAND: Nelson—Wairau Valley, Buller Valley, T. F. C. Canterbury—Kowai River, Petrie! Ashly Gorge, Cockayne! Sea-level to 3000 ft. November–January.

A variable plant, not always readily distinguishable from states of *C. hexsepala* or *C. australis*.

5. *C. foetida*, Raoul, Choix, 23, t. 22.—Stems stout, woody; branches numerous, intertwined, often covering bushes or small trees; young shoots clothed with fulvous pubescence. Leaves 3-foliolate, slightly coriaceous, usually thinly pubescent on both surfaces, but often becoming glabrous when old; leaflets 1–2 in. long, all stalked, ovate or ovate-cordate, acute or acuminate, entire or irregularly toothed or lobed. Panicles large, much divided; branches usually densely clothed with pale or fulvous tomentum. Flowers very numerous, small, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., yellowish, strongly odorous but certainly not foetid. Sepals 6–8, linear, obtuse or acute, densely tomentose on the outside. Anthers linear-oblong, obtuse. Achenes narrow-ovoid, very silky, narrowed into short plumose tails—Hook. f. *Fl. Nov. Zel.* i. 7; *Handb. N.Z. Fl.* 2; Kirk, *Students' Fl.* 4. *C. Parkinsoniana*, Col. in *Trans. N.Z. Inst.* xii. (1880) 359; xiv. (1882) 331.

NORTH AND SOUTH ISLANDS: Not uncommon in lowland districts from the North Cape to the south of Otago. September–November.

Varies considerably in size, texture, cutting of the leaves, degree of pubescence, &c.; but can always be recognised by the pale or fulvous pubescence on the leaves, young shoots, and branches of the panicle, by the small yellow flowers, which are usually produced in enormous numbers, and by the dense tomentum on the sepals. The type specimens of Mr. Colenso's *C. Parkinsoniana*, preserved in his herbarium, show no points of difference from the ordinary form of *C. foetida*.

6. *C. parviflora*, A. Cunn. *Precur.* n. 636.—More or less clothed with silky fulvous pubescence. Stems slender, wiry, not nearly so robust or so much branched as in the preceding species. Leaves 3-foliolate, thin and almost membranous, more rarely subcoriaceous, tawny-pubescent, especially on the veins and under-surface; leaflets $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, all stalked, ovate or ovate-cordate, usually entire but occasionally irregularly lobed, subacute. Panicles slender, branched; rhachis and pedicels tawny-pubescent. Flowers small, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., yellowish. Sepals 6–8, linear, more or less clothed with silky pubescence. Anthers short and broad, oblong, with a minute appendage at the apex of the connective. Achenes narrow-ovoid, silky.—Raoul, Choix, 47; Hook. f. *Fl. Nov. Zel.* i. 7; *Handb. N.Z. Fl.* 2; Kirk, *Students' Fl.* 4.

Var. *depauperata*, Hook. f. *Handb. N.Z. Fl.* 2.—Leaflets very small. Sepals narrowed into long slender points.

Var. *trilobata*, Kirk, *Students' Fl.* 5.—Leaflets deeply 3-lobed; lobes entire or cut. Flowers smaller. Sepals more pubescent.

NORTH ISLAND: The typical form in various localities from the Three Kings Islands and the North Cape to Hawke's Bay, but often local. Var. *trilobata*: Bay of Islands, *Kirk*! Northern Wairoa, *T. F. C.*; Te Aroha, *T. F. C.*; between Gisborne and Napier, *Bishop Williams*! **SOUTH ISLAND:** Var. *depauperata*: Nelson, *Travers*. Var. *trilobata*: Okarita, *A. Hamilton*. Sea-level to 1500 ft. September–November.

A handsome species, closely allied to *C. fœtida*, but at once distinguished by the smaller size, more slender habit, smaller and thinner usually entire leaflets, narrower silky sepals, and especially by the broad anthers, which have a minute swelling at the tip of the connective. I have not seen specimens of Hooker's var. *depauperata*.

7. *C. afoliata*, *Buch. in Trans. N.Z. Inst.* iii. (1871) 211.—Stems and branches leafless, wiry, striate, glabrous, often much intertwined. Leaves usually reduced to petioles in the mature plant, when present consisting of 3 minute long-stalked ovate or triangular leaflets; in young plants more frequently developed and rather larger. Flowers greenish-white, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., in fascicles of 2–5 in the axils of the petioles; peduncles slender, pilose, each with a pair of minute ovate bracteoles. Sepals 4, ovate- or oblong-lanceolate, usually acute, silky. Anthers linear. Achenes ovoid, silky.—*Kirk, Students' Fl.* 3. *C. aphylla*, *Col. in Trans. N.Z. Inst.* xix. (1886) 259.

NORTH ISLAND: Without locality, *Colenso*! Puketapu (Hawke's Bay), *H. Hill*! **SOUTH ISLAND:** Various localities from Nelson to Otago, but local. *Picton*, *J. Rutland*! Marlborough, *Buchanan*; Hammer Plains, *H. J. Matthews*! Waiau River, *Kirk*; Canterbury Plains, *N. T. Carrington*! Waitaki Valley, *Buchanan*, *Petrie*! Duntroon, *Petrie*! Sea-level to 2000 ft. September–October.

A very curious plant, often forming dense masses of intertwined stems and branches several feet in length. I have not seen flowering specimens of Mr. Colenso's *C. aphylla*, but the stems and branches show no difference from the common state of the species.

8. *C. marata*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 335.—Stems slender, much branched, often forming dense interlaced masses scrambling over bushes or among grass, brownish-green, pubescent, grooved. Leaves 3-foliolate, usually pubescent on both surfaces; petioles variable in length, 1–4 in.; leaflets small, $\frac{1}{6}$ – $\frac{1}{2}$ in. long, all stalked, exceedingly variable in shape, narrow-linear to ovate, acute or obtuse, entire notched or lobed, or even again 3-partite. Peduncles 1-flowered, solitary or 2–4 together in the axils of the leaves, pubescent. Bracteoles in 2 pairs, connate at the base, upper pair much the larger, often foliaceous. Flowers yellowish, small, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., sweet-scented. Sepals 4, linear-oblong, acute or obtuse, silky. Anthers linear. Achenes narrow, margined, silky or nearly glabrous when old, narrowed into rather long plumose tails.—*Kirk, Students' Fl.* 4.

NORTH ISLAND: Upper Thames Valley, from Te Aroha southwards, *T. F. C.*, *Petrie*! Taupo, *T. F. C.*; East Cape, *Kirk*; probably not uncommon in the interior. **SOUTH ISLAND:** Apparently common throughout, *Armstrong*! *Buchanan*! *Kirk*! &c. Sea-level to 3000 ft. September–November.

The brownish colour, slender habit, minute leaflets, and small flowers distinguish this from all others except *C. quadribacteolata*, to which some forms approach far too closely. A variety collected by Mr. Petrie at Tuapeka (Otago) appears to be quite intermediate, and might almost be referred to either species. North Island specimens are usually more slender and have smaller leaflets than the southern ones. Some of Mr. Petrie's Otago specimens are remarkable for their large foliaceous bracteoles, which are linear-spathulate and sometimes $\frac{3}{4}$ in. long.

9. *C. quadribacteolata*, Col. in *Trans. N.Z. Inst.* xiv. (1882) 329.—Stems and branches very slender, branched, trailing, 1–3 ft. long, glabrous except the very young shoots. Leaves few, trifoliate; petioles slender, 1–2 in. long; leaflets minute, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, usually linear or lanceolate, but varying to linear-oblong, ovate-lanceolate, or triangular-acute, glabrous, entire or one or all 3-lobed. Peduncles solitary or 2–3 together in the axils of the leaves, 1-flowered, usually shorter than the petioles, pubescent; bracteoles 2 or 3 pairs, connate, upper the largest, sheathing at the base, rounded, obtuse. Flowers purplish, sweet-scented, $\frac{1}{4}$ – $\frac{3}{4}$ in. diam. Sepals 4, linear or linear-oblong, usually acute, silky. Anthers linear. Achenes small, almost glabrous when fully ripe, narrowed into short plumose tails.—*Kirk, Students' Fl.* 4. *C. foetida* var. *depauperata*, *Hook. f. Fl. Nov. Zel.* i. 7; *Handb. N.Z. Fl.* 2.

NORTH ISLAND: Low grounds in the Hawke's Bay District; Lake Rotoatara, *Colenso!* Petane, *A. Hamilton!* between the Ngaruroro and Tukituki Rivers, *Sturm.*

This can only be separated from the preceding by its smaller size, more slender habit, narrower leaflets, purplish flowers, and narrower sepals. Further investigation may prove both to be forms of one variable plant.

2. MYOSURUS, Linn.

Annual herbs, of small size. Leaves all radical, linear, entire. Scapes usually numerous, naked, 1-flowered. Sepals 5, rarely more, minutely spurred at the base. Petals wanting in the New Zealand species. Stamens 5–8. Carpels numerous; ovules solitary, pendulous. Achenes closely packed on a long and slender spike-like receptacle which usually lengthens much as they ripen, each with a raised nerve on the back, ending in a short persistent style.

A small genus of only two species, one of which is widely spread in the north temperate zone, and is also found in Australia; the other is known only from California, Chili, and New Zealand.

1. *M. aristatus*, *Benth. in Lond. Journ. Bot.* vi. 459.—Varying in size from 1–3 in. Leaves numerous, $\frac{1}{20}$ in. broad or even less, erect, linear or linear-spathulate. Scapes usually several, slender, 1-flowered. Flower minute, yellowish, apetalous. Sepals 5, spur short. Stamens generally 5. Receptacle in fruit oblong or linear, $\frac{1}{4}$ – $\frac{3}{4}$ in. long; achenes with a short beak.—*Hook. f. Fl. Nov. Zel.* i. 8; *Handb. N.Z. Fl.* 3; *Kirk, Students' Fl.* 5.

NORTH ISLAND: Palliser Bay, *Colenso*! Ocean beach near Wellington, *Buchanan*. SOUTH ISLAND: Moist gravelly places near Lake Tekapo, *T. F. C.* Otago—Hyde, Beaumont, Speargrass Flat, Ida Valley, Lake Wanaka, *Petrie*! Gimmerburn, *Kirk*! Altitudinal range from sea-level to 2500 ft.

3. RANUNCULUS, Linn.

Herbs with petioled entire lobed or dissected leaves and yellow or white flowers. Sepals 3–5, deciduous. Petals usually about 5, but varying in number from 4 to 20, with 1–3 glandular pits or scales near the base. Stamens many. Carpels usually numerous; styles short; ovules solitary, ascending. Achenes numerous, 1-seeded, collected into a globular or ovoid head, tipped with the persistent straight or recurved style.

A large genus of about 175 species, dispersed over the whole world, but most numerous in temperate or cool regions. In New Zealand it forms a very conspicuous portion of the mountain vegetation, especially in the South Island; some of the species, as *R. Lyallii* and *R. insignis*, being the finest known. Many of them are exceedingly variable and difficult of discrimination, especially in the section with compressed achenes. Of the 37 species known, 4 are found in Australia, 1 in Chili, and another in Kerguelen's Island; the remaining 31 are endemic. In addition to the native species, 8 or 9 from the Northern Hemisphere have become naturalised as weeds in pastures and waste places, the most abundant being *R. bulbosus*, L., *R. hirsutus*, Curt. (*R. sardous*, Crantz), and the typical state of *R. parviflorus*, L. References to descriptions of these will be found in the appendix.

A. Stems tall, erect. Flowers large. Achenes villous or silky.

* Flowers white.

Leaves large, peltate, margins simply crenate 1. *R. Lyallii*.
Leaves 3–5-partite or dissected; segments usually linear 2. *R. Buchananii*.

** Flowers yellow.

Villous. Leaves rounded-cordate or reniform, crenate-lobed 3. *R. insignis*.
Glabrous. Leaves broadly oblong, crenate. Achenes only slightly hairy 4. *R. Godleyanus*.

B. Stems erect, without creeping stolons. Achenes glabrous, turgid or angled, not compressed or margined, never muricate or tuberculate.

* Stems usually stout, 4–16 in. high. Leaves broad, reniform to ovate, coarsely crenate or dentate.

Leaves reniform to ovate. Scapes 1–many-flowered.
Petals twice as long as the sepals 5. *R. Monroi*.
Leaves rounded-reniform. Scape thickened above, seldom more than 1-flowered. Petals hardly longer than the sepals 6. *R. pinguis*.

** Stems tall, slender. Leaves deeply cut and lobed. Petals narrow, 8–15.

Pilose, stems 1–3 ft., many-flowered. Flowers 1–1½ in. diam. 7. *R. nivicola*.
Glabrous or slightly pilose, stems 6–8 in., few-flowered.
Flowers ½–1 in. diam. 8. *R. geraniifolius*.

*** Stems short, simple. Leaves usually all radical. Scapes 1-flowered (1-3-flowered in *R. Haastii*, and sometimes 2-flowered in *R. Enysii*).

- Glabrous, 6-15 in. high. Leaves 3-5-foliolate. Scapes 1-5.
 Achenes ovoid; style short, straight or curved .. 9. *R. Enysii*.
 Pilose or nearly glabrous, 6-15 in. high. Leaves 3-5-partite. Achenes fusiform, narrowed into a long spirally recurved style .. 10. *R. tenuicaulis*.
 Short, stout, glabrous, almost stemless. Leaves all radical, fleshy or coriaceous, palmatipartite or 3-foliolate or 3-5-lobed.
 Leaves few, coriaceous, palmatipartite; segments lacinate. Scape 1-3-flowered, with crowded lacinate bracts under the flowers .. 11. *R. Haastii*.
 Leaves biternately multifid, glaucous and fleshy; segments $\frac{1}{2}$ in. long. Scape shorter than the leaves .. 12. *R. crithmifolius*.
 Leaves many, 3-partite; segments lobed. Scape shorter than the leaves .. 13. *R. chordorhizos*.
 Leaves 1-3, 3-lobed; segments toothed or crenate. Scape longer than the leaves .. 14. *R. paucifolius*.
 Small. Leaves orbicular-reniform, 3-lobed to the middle; lobes crenate. Scape longer than the leaves .. 15. *R. Berggreni*.
 Small. Leaves trifoliolate, leaflets lobed or partite. Scape longer than the leaves .. 16. *R. novæ-zealandiæ*.
 Stout or slender; silky, pilose, or glabrate. Leaves all radical, pinnate, pinnatisect, or pinnately multifid.
 Stout. Leaves tripinnatisect, usually copiously silky. Scape stout. Flower large .. 17. *R. sericophyllus*.
 Slender, almost glabrous. Leaves bipinnatisect or multifid; segments very narrow. Scape slender. Flowers small .. 18. *R. Sinclairii*.
 Slender, pilose. Leaves pinnate; pinnæ 3-lobed or -partite; segments oblong or cuneate. Scape slender. Flowers small .. 19. *R. gracilipes*.
C. Stems not creeping. Achenes glabrous, compressed, with a thickened margin, not muricate. (Achenes sometimes obscurely compressed, but always thinner than in the previous section. The margins are said to be not thickened in R. aucklandicus.)
 Stems branched, leafy, 6-24 in. high. Leaves trifoliolate or biternate. Sepals reflexed .. 20. *R. hirtus*.
 Small, stemless, $1\frac{1}{2}$ in. high at most. Leaves rosulate, 3-lobed or -partite, exceeding the flower .. 21. *R. recens*.
 Slender, 3-6 in. high. Leaves trifoliolate; leaflets all stalked, obtuse. Achenes few, 3-5 .. 22. *R. Kirkii*.
 Stems short, simple. Leaves all radical, usually toothed or 3-5-lobed, rarely partite. Scapes 1-5, longer than the leaves. Sepals spreading .. 23. *R. lappaceus*.
 Stems branched, hirsute, leafy. Leaves coarsely toothed or 3-lobed. Scapes radical and axillary, not exceeding the leaves .. 24. *R. foliosus*.
 Erect or suberect, clothed with short stiff appressed hairs. Leaves deltoid-cordate, 3-partite. Scapes 1-3-flowered, longer or shorter than the leaves. Sepals spreading .. 25. *R. subscaposus*.
 Erect, clothed with strigose pubescence. Leaves rounded, 3-partite. Scapes 1 or 2, each with 1-3 flowers .. 26. *R. Hectori*.
 Erect, strigose-hirsute. Leaves rounded-reniform, 3-partite. Scapes 1-3, 1-flowered. Achenes compressed, margins not thickened .. 27. *R. aucklandicus*.

D. Stems creeping, or with creeping stolons. Achenes glabrous, not muricate.

- Stems robust, branched, prostrate and rooting at the nodes. Leaves 3-toothed or -lobed. Scapes short, axillary 28. *R. Cheesemanii*.
 Stems weak, matted, often rooting at the nodes. Leaves tufted, trifoliate; leaflets often again divided, small. Flowers minute 29. *R. ternatifolius*.
 Small, depressed, stoloniferous, 1½ in. high at most. Leaves ternatisect or multifid, segments narrow-linear. Scapes naked, 1-flowered; flower small 30. *R. depressus*.
 Small, much depressed, 1½ in. high at most. Rootstock creeping, much branched. Leaves cuneate. Scape 1-flowered; flower large 31. *R. pachyrrhizus*.
 Stems fistulose, creeping and rooting at the nodes. Leaves on petioles 6-18 in. long; blade 3-5-partite, 1-2½ in. diam., segments broad 32. *R. macropus*.
 Stems creeping and rooting at the nodes or floating. Leaves on petioles 1-6 in. long; blade 3-5-partite, 1½-1½ in. diam., segments usually narrow 33. *R. rivularis*.
 Stems creeping and matted. Leaves small, 3-foliate. Scapes shorter than the leaves, 1-flowered 34. *R. acaulis*.
 Stems creeping and rooting at the nodes. Leaves fleshy, reniform, 3-lobed or -partite 35. *R. crassipes*.
 Stems filiform, creeping and matted. Leaves linear-spathulate, entire. Flowers minute, tetramerous 36. *R. limosella*.

E. Achenes muricate or tuberculate.

- Small, annual. Stems slender, branched. Flowers minute, almost sessile, opposite the leaves 37. *R. parviflorus*,
 var. *australis*.

1. **R. Lyallii**, Hook. f. *Handb. N.Z. Fl.* 4.—A tall, erect, exceedingly handsome plant, with a paniculately branched flowering-stem 1-4 ft. in height. Rootstock stout, with long fleshy roots. Radical leaves on long stout petioles with broad silky sheathing bases; limb 6-15 in. diam., orbicular, peltate, concave, crenate, coriaceous, glabrous or with a few weak hairs. Cauline leaves few, sessile, lower reniform, upper cuneate-rhomboid or oblong-cuneate, lobed and crenate. Leaves of young plants not peltate, reniform to rhomboid, cuneate at the base. Peduncles stout, villous, with 1-2 linear bracts. Flowers numerous, 2-3 in. diam., white, more rarely cream-coloured. Sepals 5, broad, villous. Petals usually numerous, cuneate-obovate, with an obscure gland at the base. Stamens many, short; anthers oblong. Receptacle oblong, cylindrical, hairy. Ripe achenes forming a head ¾ in. diam., oblique, turgid, villous, narrowed into long slender flexuous styles.—*Bot. Mag.* t. 6888; *Kirk, Students' Fl.* 7.

Var. **Traversii**.—Smaller. Leaves 5-7 in. diam., doubly crenate, and with two incisions near the base. Flowers cream-coloured.—*R. Traversii*, Hook. f. *Handb. N.Z. Fl.* 4; *Kirk, Students' Fl.* 7.

SOUTH ISLAND: Abundant in the central and western portions of the Southern Alps, from the Spenser Mountains to the south of Otago. STEWART ISLAND: Mount Anglem, *Kirk*. Altitudinal range from 2000 to 5000 ft. November-January. Var. *Traversii*: Hurunui Mountains, Canterbury, *Travers*.

A magnificent plant, by far the finest of the genus; so common in many portions of the Southern Alps that in summer the mountain-slopes are whitened from the abundance of the flowers. It has received many local names, as the "mountain lily," "shepherd's lily," "Mount Cook lily," &c. Its nearest ally outside New Zealand is *R. Baurii*, MacOwan, from the Transvaal, which has peltate leaves 4-5 in. diam. and small yellow flowers. *R. Traversii* does not seem to have been observed since its first discovery more than forty years ago. I have seen no specimens, but I am indebted to the Director of the Kew Herbarium for a drawing of the type specimen, which leaves no doubt in my mind that it is merely a local form of *R. Lyallii*.

2. *R. Buchananii*, Hook. f. *Handb. N.Z. Fl.* 5.—Stout, erect, more or less covered with long silky hairs, rarely almost glabrous. Rootstock thick, with numerous long fleshy rootlets. Radical leaves on long petioles 2-6 in. long, with short and broad sheathing bases; blade reniform in outline, 2-6 in. diam., ternatisect, main divisions stalked, more or less deeply divided into linear or cuneate lobes, which are usually again 3-5-fid or -toothed, rarely entire. Cauline leaves similar, but usually more finely cut, sessile or nearly so. Flowers solitary or 2-3, large, white, $1\frac{1}{2}$ - $2\frac{1}{2}$ in. diam. Sepals 5, oblong, villous. Petals very numerous, linear-oblong, rounded at the apex, narrowed to the base; gland solitary, basilar. Achenes turgid, pilose, forming a globose head $\frac{1}{2}$ in. diam.—*Kirk, Students' Fl.* 8.

SOUTH ISLAND: Otago—Lake district, *Buchanan!* Mounts Bonpland, Tyn-dall, and Aspiring, *Petrie!* Bald Peak, *B. C. Aston!* Mount Earnslaw, *H. J. Matthews!* Altitudinal range 4000-6000 ft. December-January.

A singular and beautiful plant, quite unlike any other, confined, so far as is known, to the high mountains to the west of the Otago lake district. The leaves are said to be sometimes nearly entire, and the flowers yellow, but I have not seen specimens showing these peculiarities.

3. *R. insignis*, Hook. f. *Fl. Nov. Zel.* i. 8, t. 2.—A stout, erect, paniculately branched plant 1-3 ft. in height, usually villous in all its parts, brownish or rufous when dry. Radical leaves numerous, large, on stout petioles with broad sheathing bases, thick and coriaceous, rounded-cordate or reniform, crenate and often shortly lobed, 4-9 in. diam.; cauline smaller, upper ones cut and lobed. Peduncles often very numerous, stout; bracts linear-oblong. Flowers golden-yellow, 1-2 in. diam. Sepals 5, woolly at the back. Petals 5-6, rarely more, obcordate, with 1 or 2 glands at the base. Stamens many, short. Receptacle oblong, pubescent. Achenes forming a rounded head $\frac{1}{2}$ in. diam., tumid, villous; style long, slender.—*Handb. N.Z. Fl.* 4; *Kirk, Students' Fl.* 7. *R. ruahenicus*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 256. *R. sychnopetala*, *Col. l.c.* xxv. (1893) 324, and xxvi. (1894) 313 (a monstrous state with very numerous narrow petals). *R. rufus*, *Col. l.c.* xxviii. (1896) 591.

Var. *b*, *lobulatus*, *Kirk, Students' Fl.* 8.—Leaves membranous, suborbicular, deeply lobed or sinuate, with a few weak hairs, rarely sub-peltate.

NORTH ISLAND : High mountains of the interior, from the East Cape southwards : Hikurangi ; mountains near Waikaremoana ; Tongariro and Ruapehu ; Ruahine Mountains ; Tararua Mountains. SOUTH ISLAND : Nelson mountains, not uncommon as far south as Lake Tennyson, *T. F. C.* ; Kaikoura Mountains, *Kirk*. Var. *b.* : Marlborough—Kowai River and Mount Fyffe, *Kirk*.

A beautiful plant, varying much in size, stoutness, degree of hairiness, &c. I have seen no South Island specimens equalling in size and number of flowers those collected by Colenso more than fifty years ago on the Ruahine Mountains, and now preserved in his herbarium. Mr. Kirk's variety *lobulatus* is not in flower, and may prove distinct.

4. **R. Godleyanus**, *Hook. f. Handb. N.Z. Fl.* 723.—Stout, erect, glabrous, 1–2 ft. high. Leaves all radical, on thick fleshy petioles 2–6 in. long by $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. ; blade 3–6 in. long, broadly oblong, rounded at the apex, cordate rounded or cuneate at the base, coarsely crenate, fleshy or coriaceous ; veins reticulate. Scape stout, usually longer than the leaves, naked below, bearing above the middle 2–4 large sessile or shortly stalked oblong or rounded bracts, from the axils of which proceed several simple or branched flowering peduncles, each of which usually bears 1–2 secondary bracts. Flowers numerous, large, 1–2 in. diam., golden-yellow. Sepals 5, broadly oblong. Petals 5, cuneate-obovate, emarginate, with 2–3 naked glands at the base. Receptacle broadly oblong, pilose ; achenes numerous, somewhat turgid, sparingly pilose or nearly glabrous, gradually narrowed into a slender curved style.—*Kirk, Students' Fl.* 8.

SOUTH ISLAND : Southern Alps, at Whitcombe's Pass, at the head-waters of the Rakaia River, alt. 4000 ft., *Haast ! Armstrong ! Enys !* Mount Cook, *Herb. Petrie !*

A remarkable species, apparently with a very restricted distribution. All the specimens I have seen are more or less imperfect, with the exception of two gathered by Enys, and not one of them shows perfectly ripe achenes.

5. **R. Monroi**, *Hook. f. Fl. Nov. Zel.* ii. 323.—Short, stout, 4–12 in. high or more, more or less silky-villous or almost glabrous. Rootstock short, clothed with the persistent bases of the old leaf-sheaths. Leaves all radical, on short stout petioles with broad sheathing bases, coriaceous or almost fleshy, sometimes thinner and submembranous ; blade variable in outline, 1–4 in. diam., reniform rounded or ovate, cordate or rounded at the base, coarsely crenate or crenate-lobulate. Scapes simple or sparingly branched, 1–3-flowered ; bracts entire or deeply lobed. Flowers yellow, $\frac{1}{2}$ –1 in. diam., rarely more. Sepals 5, linear-oblong, obtuse, glabrous or silky. Petals 5–8, almost twice as long as the sepals, narrow obovate-cuneate, each with a single glandular pit at the base. Achenes numerous, forming a small globose head, usually glabrous, turgid, keeled at the back ; style straight or recurved.—*Kirk, Students' Fl.* 9. *R. pinguis* var. *a.*, *Hook. f. Handb. N.Z. Fl.* 5. *R. Muelleri*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 215, t. 16.

Var. *b*, **sericeus**, *Kirk, Students' Fl.* 9.—Achenes clothed with silky hairs.

Var. *c*, **dentatus**, *Kirk, l.c.* 9.—Leaves broadly ovate to ovate-lanceolate, coarsely toothed or dentate, clothed on both surfaces with strigose ferruginous pubescence, sometimes almost shaggy.

NORTH ISLAND: Tararua Mountains, *Buchanan!* SOUTH ISLAND: Wairau Gorge and Tarndale, *Sinclair, T. F. C.*; Spenser Mountains, Kaikoura Mountains, *Kirk!* Marlborough, *Monro*; Clarence Valley, *T. F. C.*; Mount Torlesse and Upper Waimakariri, *Kirk! Cockayne!* Var. *b*: Kaikoura Mountains, *Kirk!* Var. *c*: Not uncommon in mountain districts in Marlborough and Canterbury, from the Clarence River southwards. 1500–4500 ft. December–January.

A very variable plant. united with *R. pinguis* by Hooker, but differing from that species in the petals being always much longer than the sepals, in the scape being usually branched and not thickened upwards, and in the longer styles to the achenes. The var. *dentatus* has a very different appearance to the typical form, and but for the occurrence of numerous intermediates might have been treated as a distinct species.

6. **R. pinguis**, *Hook. f. Fl. Antarct.* i. 3, t. 1.—Short, stout, usually rather fleshy, 2–10 in. high, sparingly pilose or almost glabrous. Rootstock stout, with numerous fleshy rootlets. Leaves all radical, on long stout petioles with stout sheathing bases; blade 1–3 in. diam., reniform, deeply crenate-lobed. Scape as long or longer than the leaves, stout, thickened upwards, naked or with 1–2 bracts above the middle, 1-flowered. Flower 1 in. diam., yellow. Sepals 5–6, oblong. Petals 5–8, obovate or linear-oblong, hardly as long as the sepals, with 1–3 glandular pits towards the base. Receptacle broadly oblong. Achenes very numerous, small, glabrous; style short, straight, with 3 narrow wings at the base.—*Kirk, Students' Fl.* 10. *R. pinguis*, var. *b*, *Hook. f. Handb. N.Z. Fl.* 5.

AUCKLAND AND CAMPBELL ISLANDS: Not uncommon, ascending to nearly 2000 ft., *Hooker, Filhol! Kirk!*

Sir J. D. Hooker distinguishes two varieties in the Flora Antarctica, one (var. *pilosus*) being much more hairy than the type, with linear petals always furnished with 3 glandular pits; the other (var. *rhombifolius*) smaller, with the leaves rhomboid-cuneate and 3–5-fid.

7. **R. nivicola**, *Hook. Ic. Plant.* t. 571, 572.—Erect, usually rather slender, paniculately branched above, 2–3 ft. high, more or less covered with long soft white spreading hairs or nearly glabrous. Rootstock short, stout. Radical leaves on long petioles 4–12 in. long with broad sheathing bases; blade 3–6 in. diam. or even more, cordate-reniform, more or less deeply 3–7-lobed, lobes broadly cuneate, inciso-crenate. Cauline leaves deeply cut and lobed, upper laciniate. Flowers many, large, golden-yellow, 1–1½ in. diam. Sepals 5, linear-oblong, pilose. Petals usually numerous, 8–15, narrow cuneate-obovate, emarginate, each with a single glandular pit near the base. Achenes forming a small rounded head, glabrous, turgid; style straight, hooked at the tip.—

Hook. f. Fl. Nov. Zel. i. 8; *Handb. N.Z. Fl.* 5; *Kirk, Students' Fl.* 8. *R. reticulatus*, *Col. in Trans. N.Z. Inst.* xx. (1888) 188.

NORTH ISLAND: Mount Egmont, abundant, *Dieffenbach, Buchanan! T. F. C.; Tongariro, Ngauruhoe, and Ruapehu, G. Mair! H. Hill!* Altitudinal range 3000–6000 ft. December–February.

A remarkably graceful and beautiful plant, excellently figured in the *Icones Plantarum*.

8. ***R. geraniifolius***, *Hook. f. Fl. Nov. Zel.* i. 9, t. 3.—Erect, slender, sparingly branched, 1–2 ft. high, glabrous or occasionally villous with long white hairs, especially on the petioles. Radical leaves few, on long slender petioles 3–6 in. long; blade 2–4 in. diam., broadly reniform in outline, deeply 3–5-lobed, sometimes to the very base; lobes either cuneate and crenate-toothed or -lobed or again deeply divided into narrow linear segments. Cauline leaves sessile, usually much and finely divided. Flowers few, seldom more than 3, $\frac{1}{2}$ –1 in. diam., yellow. Sepals 5, oblong, glabrous or very slightly pilose. Petals usually numerous, 8–15, linear-oblong, rounded at the tip, with a single basal gland. Achenes forming a small globose head, glabrous, turgid; style short, subulate.—*Handb. N.Z. Fl.* 5; *Kirk, Students' Fl.* 9. *R. verticillatus*, *Kirk, l.c.* 13.

NORTH ISLAND: Hikurangi, *Colenso! Ruahine Mountains, Colenso! Olsen! Petrie! Tararua Mountains, Buchanan! Arnold! Townson!* SOUTH ISLAND: Mountains of Nelson, not uncommon as far south as Lake Tennyson, *Monro, T. F. C. Mount Murchison, Townson! Mount Stokes, Macmahon, Kirk.* Altitudinal range 2500–5000 ft. December–January.

Closely allied to the preceding species, but easily distinguished by the smaller size, more slender habit, fewer leaves (which are often very finely cut), fewer and smaller flowers, and by the petals being usually rounded at the tip. Mr. Kirk's *R. verticillatus* is based upon a single imperfect specimen, without locality, in Mr. Buchanan's herbarium. I consider that it is a small one-flowered state of *R. geraniifolius*, with which it exactly agrees in habit, pubescence, and flowers, differing only in the more rounded leaf-segments, a character of little importance in a species with such variable foliage.

9. ***R. Enysii***, *T. Kirk in Trans. N.Z. Inst.* xii. (1880) 394.—Slender, leafy, glabrous, 6–15 in. high. Rootstock rather stout, with numerous fibrous rootlets. Leaves all radical, numerous; petioles 2–6 in. long, grooved; blade 1–3 in. diam., 3–5-foliolate or biternate; leaflets long-stalked, very variable in size and amount of cutting, sometimes large and rounded, toothed or 3–5-lobed, at other times smaller and cut to the base into 3–5 narrow-cuneate incised toothed or lobed segments, occasionally pinnately divided. Scapes 1–5, longer than the leaves, simple or rarely with 1–2 short branches, naked or with a single stalked or sessile variously divided cauline leaf. Flower $\frac{1}{2}$ –1 in. diam. Sepals 5, broadly ovate. Petals usually 5, rarely more, broadly obovate, with a single basilar gland. Achenes forming a small rounded head, numerous, turgid, glabrous; style short,

stout, straight or curved.—*Students' Fl.* 13. *R. tenuis*, *Buch. in Trans. N.Z. Inst.* xx. (1888) 255, t. 12.

SOUTH ISLAND: Canterbury—Not uncommon on the mountains of the Middle Waimakariri from Mount Torlesse to Bealey, *Enys!* *Kirk!* *Petrie!* *Cockayne!* *T. F. C.* Otago—Lake Harris, *Kirk!* East Taieri, *Buchanan!* 2000–4000 ft. December–February.

A well-marked species, apparently not closely allied to any other. Mr. Buchanan's *R. tenuis* differs from the type in the leaves being more pinnately divided, but is clearly the same species. I have a specimen with finely cut, almost decomposed leaves, collected by Mr. Cockayne on the Candlestick Mountains, Canterbury.

10. *R. tenuicaulis*, *Cheesem. in Trans. N.Z. Inst.* xvii. (1885) 235.—Very slender, erect, sparingly pilose or nearly glabrous, 4–18 in. high. Rootstock slender, with numerous fleshy rootlets. Leaves all radical, on slender petioles 2–6 in. long; blade $\frac{1}{2}$ –1 $\frac{1}{2}$ in. diam., about reniform in outline, cut to the base into 3, rarely 5, broadly cuneate divisions, which are deeply and irregularly 2–3-lobed; lobes narrow, often again toothed. Scape very slender, grooved, 1-flowered, usually with 2–3 simple or variously cut or lobed bracts about the middle. Petals 5, linear, acute. Achenes 5–20, loosely packed, spreading, shortly stipitate, fusiform, gradually narrowed into a long spirally recurved style.—*Kirk, Students' Fl.* 14.

SOUTH ISLAND: Canterbury—Mountains above Arthur's Pass, *T. F. C.*; Craigieburn Mountains, *Cockayne!* Otago—Swampy Hill, Lee Stream, Mount Kyeburn, Clinton Saddle, *Petrie!*

A very curious species, remarkable for the fusiform achenes and long spirally recurved style.

11. *R. Haastii*, *Hook. f. Handb. N.Z. Fl.* 6.—A very remarkable stout fleshy or coriaceous glaucous plant, 2–6 in. high, glabrous except the leaf-sheaths, which are usually villous with long hairs. Rootstock stout and fleshy, often 6 in. long and as thick as the thumb, viscid and milky when bruised, horizontal, giving off numerous long and stout rootlets as thick as whipcord. Radical leaves 1 or 2; petioles stout, fleshy, tapering downwards, 2–6 in. long; blade 2–4 in. diam., broadly reniform or orbicular in outline, palmately cut to the base into 5–7 deeply and irregularly incised and lobed segments. Scape very thick and fleshy, grooved when dry, naked below, furnished above with 1–3 sessile cauline leaves which are deeply cut into linear lobes, forming a leafy involucre to the flowers. Peduncles 1–3, barely exceeding the cauline leaves, 1-flowered. Flowers 1–1 $\frac{1}{2}$ in. diam., yellow. Sepals 5, oblong, glabrous or nearly so. Petals 8–15, narrow-cuneate; gland single, basilar. Receptacle swollen, papillose. Achenes forming a rounded head $\frac{3}{4}$ in. diam., glabrous, turgid; style flattened, pointed, very broad at the base, the margins continued down the front and back of the achene as wings.—*Kirk, Students' Fl.* 10.

SOUTH ISLAND: Bare shingle slopes on the mountains, not uncommon from the south of Nelson (Wairau Valley) to Central Otago. Altitudinal range 3000-6000 ft. December-January.

A very singular plant, quite unlike any other. I do not find that Otago specimens have their leaves less divided than those from Canterbury and Nelson, as stated by Kirk in "The Students' Flora."

12. *R. crithmifolius*, Hook. f. *Handb. N.Z. Fl.* 6.—Small, perfectly glabrous, very fleshy, glaucous, stemless; rootstock short, stout, horizontal, with thick fleshy fibres. Leaves all radical, on recurved petioles 1-2 in. long; blade broad, $\frac{1}{2}$ -1 in. diam., reniform in outline, biternately multifid; segments short, linear, $\frac{1}{10}$ in. long, obtuse. Scape stout, fleshy, erect, shorter than the leaves, single-flowered. Flowers small. Sepals linear-oblong. Petals not seen. Achenes in a globose head, $\frac{1}{3}$ in. diam., turgid, keeled; style sharp, straight, subulate.—Kirk, *Students' Fl.* 11.

SOUTH ISLAND: Wairau Gorge, on shingle-slips, alt. 6000 ft., Travers.

A curious little plant, which has not been collected since its original discovery nearly forty years ago. There are no specimens in any of the New Zealand herbaria, and I have consequently reproduced Hooker's description. He remarks that it is easily recognised by its glaucous fleshy habit, finely divided leaves, and single-flowered short scapes.

13. *R. chordorhizos*, Hook. f. *Handb. N.Z. Fl.* 723.—Small, stout, fleshy and coriaceous, 2-3 in. high, everywhere perfectly glabrous. Rootstock short, thick, with numerous long fleshy rootlets. Leaves all radical; petioles stout, 1-2 in. long, with broad thin sheathing bases; blade $\frac{3}{4}$ -1 $\frac{1}{2}$ in. diam., orbicular in outline, 3-lobed or 3-partite to the base, segments obovate-spathulate or cuneate, sometimes petiolulate, inciso-crenate or again lobed; upper surface pitted or wrinkled when dry. Scapes usually solitary but sometimes 2-3, short, not exceeding the petioles, naked, 1-flowered. Flower $\frac{1}{2}$ -1 in. diam. Sepals 5, narrow-oblong. Petals 5-6, nearly twice as long as the sepals, narrow linear-oblong, with 1-3 glandular pits near the base. Achenes forming a small globose head, rounded, turgid, glabrous; style as long as the achene, curved, subulate.—Kirk, *Students' Fl.* 10.

SOUTH ISLAND: Canterbury—Macaulay River and Mount Somers, Haast (Handbook); Lake Ohau, Buchanan! Otago—Mount Kyeburn and Mount St. Bathans, Petrie! Altitudinal range 3000-5000 ft. December-January.

Hooker based his *R. chordorhizos* upon specimens collected by Haast at the Macaulay River and Mount Somers, and also included a plant obtained on limestone gravel in the Waimakariri district. Kirk considered the Waimakariri plant to be distinct from the others, and has established the next species (*R. paucifolius*) upon it. The Macaulay River plant he assumed to be the same as Buchanan's and Petrie's, quoted above. Whether this view is correct can only be determined by examination of the types at Kew.

14. *R. paucifolius*, T. Kirk, *Students' Fl.* 11.—Small, stout, coriaceous, 2-4 in. high, perfectly glabrous. Rootstock short, stout,

with very numerous long fleshy rootlets. Leaves 2-3, all radical, on short stiff petioles 1-2 in. long, with broad sheathing bases; blade 1-2 in. diam., suborbicular or broader than long, slightly cordate or almost cuneate at the base, 3-lobed to the middle; lobes overlapping, sharply and finely toothed or crenate. Scape solitary, stout, naked, 1-flowered, about equalling the leaves. Sepals 5, oblong. Petals 5. Achenes few, forming a small rounded head, turgid, glabrous; style straight, subulate.

SOUTH ISLAND: Canterbury—*Débris* of limestone rocks at Castle Hill, Middle Waimakariri, alt. 2500 ft., *J. D. Enys*!

Much more complete material is required before a good description can be given of this curious little plant. It is very close to the preceding species, but seems sufficiently distinct in the less fleshy and more coriaceous habit; fewer leaves, which are broader, and much less divided; longer scape, and broader petals. Only one flowering specimen has been obtained.

15. **R. Berggreni**, *Petrie in Trans. N.Z. Inst.* xix. (1887) 325; *l.c.* xxxi. (1899) 352, t. 26.—Small, stemless, perfectly glabrous. Rootstock stout, with numerous fleshy rootlets. Leaves all radical, coriaceous; petioles slender, flattened, $\frac{1}{2}$ -1 in. long; blade orbicular or reniform, with an open sinus, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., unequally 3-lobed to the middle, rarely almost 3-partite; lobes rounded, irregularly crenate or crenate-lobed. Scapes 1 or 2, 1-flowered, naked, 1-3 in. long. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. Sepals 5, ovate, margins scarious. Petals 5, obovate, rounded at the tip, with a single conspicuous gland at the base. Styles rather long, recurved. Ripe achenes not seen.—*Kirk, Students' Fl.* 12.

SOUTH ISLAND: Otago—Carrick Range, alt. 4000 ft., *Petrie*! November-December.

A pretty and distinct little species, the exact relationship of which cannot be determined until ripe achenes are obtained.

16. **R. novæ-zealandiæ**, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 266.—Small, stout, somewhat fleshy and glaucous, perfectly glabrous. Rootstock short, stout, clothed with the remains of the old petioles; root-fibres long and thick. Leaves all radical, coriaceous, on short flattened petioles $\frac{1}{2}$ -1 in. long; blade $\frac{1}{2}$ -1 $\frac{1}{4}$ in. long, trifoliolate; lateral leaflets sessile, terminal long-stalked, all more or less deeply 3-lobed or -partite, sometimes to the base, segments crenate. Scapes 1-3, short, stout, naked, 1-flowered, 1-3 in. long. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. Sepals 5, oblong, much shorter than the petals. Petals 5, obovate-cuneate, rounded at the tip, with a single broad gland near the base. Ripe achenes not seen.—*Kirk, Students' Fl.* 13.

SOUTH ISLAND: Otago—Rock and Pillar Range, opposite Middlemarch; Old Man Range, alt. 4000 ft., *Petrie*! November-December.

This looks like *R. Berggreni* with trifoliolate leaves; in fact, the terminal leaflet often exactly matches a small-sized leaf of that species. But it is premature to speculate as to its affinities until the ripe achenes are known.

17. **R. sericophyllus**, *Hook. f. Handb. N.Z. Fl.* 6.—A handsome short stout pale-green plant 2–8 in. high, usually densely covered with long silky hairs, but sometimes nearly glabrous. Rootstock short, stout. Leaves numerous, somewhat membranous, all radical; petioles short or long, 1–5 in., with very broad membranous sheathing bases; blade $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, broadly ovate in outline, tripinnatisect, ultimate divisions small, linear or linear-oblong, acute or nearly so, generally tipped with a pencil of silky hairs. Scape usually longer than the leaves, stout, erect, 1-flowered, naked or with an entire or laciniate bract. Flowers large, golden-yellow, 1–1 $\frac{1}{2}$ in. diam. or even more. Sepals oblong, membranous, almost equalling the petals. Petals 5–8, usually broad, obovate-cuneate, rounded at the tip; glands generally 3, near the base. Achenes forming a rounded head 1 $\frac{1}{2}$ in. diam., glabrous, turgid, keeled at the back; style stout, subulate.—*Kirk, Students' Fl.* 12.

SOUTH ISLAND: Canterbury—Poulter River, *Cockayne!* Browning's Pass, Mount Brewster, Hopkins River, *Haast!* Mount Cook district, *Dixon, T. F. C.* Otago—Lake district, *Buchanan!* Matukituki Valley, near Mount Aspiring, mountains near Lake Hawea, *Petrie!* Humboldt Mountains, *Cockayne!* Altitudinal range 3500–7000 ft. December–January.

An exceedingly beautiful little plant, very abundant in the Mount Cook district, where it ascends to quite 7000 ft. Mr. Petrie's specimens from near Mount Aspiring are more slender and almost glabrous, and the petals are more numerous and narrower. Mr. Cockayne's, from the Humboldt Mountains, have the leaves much less divided, with broader segments, but the petals have the 3 large glands of the type.

18. **R. Sinclairii**, *Hook. f. Handb. N.Z. Fl.* 6.—Small, slender, 2–6 in. high, sparingly pilose with long white silky hairs or almost glabrous. Rootstock stout, sometimes branched above. Leaves many, all radical, 1–4 in. long, usually soft and flaccid; petioles short, sheathing at the base; blade 1–2 in. long, ovate-oblong to linear-oblong in outline, bipinnatisect or multifid; primary pinnae 2–4 pairs, opposite, often rather distant, very variable in the amount of cutting, ultimate segments narrow-linear, rarely oblong, short, acute. Scape slender, naked, 1-flowered, much longer than the leaves. Flowers small, $\frac{1}{2}$ in. diam. Sepals 5. Petals 5, nearly twice as long as the sepals, linear-obovate, with a single gland near the base. Achenes few, forming a small rounded head, turgid, glabrous; style short, straight, subulate.—*Kirk, Students' Fl.* 11.

SOUTH ISLAND: Nelson—Wairau Gorge, *Travers, T. F. C.* Tarnedale, *Sinclair!* (Herb. Kirk). Canterbury—Mountains in the middle Waimakariri district, *Enys!* *Kirk!* *Cockayne!* *T. F. C.* Otago—*Buchanan!* Maungatua, *Petrie!* Altitudinal range 2500 ft.–5000 ft. December–January.

A pretty little plant, too closely allied to the following, from which it is principally separated by the more finely cut leaves. Mr. Petrie's Maungatua specimens (distinguished by Kirk as var. *angustatus*) have narrower leaves and hairy scapes, and may belong to *R. gracilipes*.

19. **R. gracilipes**, *Hook. f. Handb. N.Z. Fl.* 8.—Small, slender, pilose or villous with long soft hairs, especially on the petioles and

scapes, 2-6 in. high. Rootstock short, rather stout, with numerous fibrous rootlets. Leaves many, all radical, 1-5 in. long, membranous, rarely subcoriaceous; petioles slender, sheathing at the base; blade linear-oblong in outline, pinnately divided; primary pinnæ 2-6 pairs, entire, 3-lobed, 3-partite, or again pinnate; ultimate segments oblong, cuneate at the base, acute or subacute. Scapes 1-3, longer than the leaves, naked, slender, pilose, 1-flowered. Flower $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. Sepals 5, oblong, silky. Petals 5, linear-obovate, rounded at the tip, with a single gland near the base. Ripe achenes not seen.—*Kirk, Students' Fl.* 12.

SOUTH ISLAND: Canterbury—Mount Dobson, and Mount Cook district, *T. F. C.*; Lake Ohau, *Haast, Buchanan!* Otago—*Buchanan!* Dunstan Mountains, Mounts Ida, Pisa, Kyeburn, *Petrie!* Humboldt Mountains, *Cockayne!* STEWART ISLAND: *G. M. Thomson!* Altitudinal range 2500-5000 ft., but descending almost to sea-level in Stewart Island. December-January.

An exceedingly variable species, only to be distinguished from *R. Sinclairii* by the narrower outline of the leaves, the more numerous shorter pinnæ, which are usually much less divided, and in small specimens often nearly entire, and by the broader ultimate segments. Many specimens are quite intermediate, and might be referred to either species. I can entertain no doubt that both are forms of one variable plant. I have never seen specimens perfectly glabrous, as described by Hooker in the Handbook, and the roots are certainly not creeping.

20. *R. hirtus*, *Banks and Sol. ex Forst. Prodr.* n. 525.—Stout or slender, erect or rarely decumbent, more or less branched, 6-24 in. high, usually clothed with soft spreading or rarely appressed hairs. Radical leaves numerous, on petioles 1-3 in. long, 3-foliolate; leaflets usually stalked, oblong to broadly ovate, rounded or cuneate at the base, coarsely and irregularly toothed or 3-5-lobed, or again 3-partite. Flowering-stems usually branched, with several cauline leaves, the lower of which are similar to the radical, the upper smaller, more sessile, and less cut or entire. Flowers small, seldom more than $\frac{1}{2}$ in. diam. Sepals 5, oblong, reflexed, fugacious, shorter than the petals. Petals 5, obovate, with a single gland near the base. Achenes forming a small rounded head, glabrous, compressed, margined; style short, hooked.—*A. Cunn. Precur.* n. 634; *Raoul, Choix de Plantes*, 47; *Hook. f. Fl. Nov. Zel.* i. 9; *Kirk, Students' Fl.* 14. *R. plebeius*, *R. Br. ex D.C. Syst.* i. 288; *Hook. f. Handb. N.Z. Fl.* 7; *Benth. Fl. Austral.* i. 13. *R. acris*, *A. Rich. Fl. Nouv. Zel.* 289 (*non Linn.*).

NORTH, SOUTH, STEWART, AND CHATHAM ISLANDS: Abundant throughout, ascending to 4500 ft. October-January. Also plentiful in Australia.

A very variable plant. The typical state can be recognised by the copious soft spreading hairs, sparingly branched stem, and trifoliolate leaves with broad coarsely toothed or lobed segments. Mr. Kirk's var. *robustus* (*Students' Fl.* 14) is simply a large state with the stem more copiously branched and the achenes slightly larger, and passes imperceptibly into the usual form. Var. *membranifolius* (*Kirk, l.c.*) recedes in the opposite direction by its reduced size, more slender stems, thin 3-lobed leaves, and smaller flowers. The following varieties are more distinct:—

Var. **elongatus**.—Tall and slender, often over 2 ft. high; sparingly hairy or almost glabrate. Leaves trifoliate or 3-ternately divided, segments cut into numerous narrow acute segments, sometimes almost digitate. Stem branched above. Differing greatly in appearance from the usual form, and in some respects coming nearer to the ordinary state in Australia. It is probably the plant referred to *R. acris* by A. Richard, but can always be distinguished from that species by the small flowers and leaves not truly digitate. Lowland districts north of Auckland.

Var. **gracilis**.—Slender, erect or suberect, 6–10 in. high, sparingly covered with silky appressed hairs. Leaves 3-foliate; leaflets often long-stalked, ovate-cuneate, irregularly and sparingly toothed or lobed. Flowers large, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. Achenes larger, with a longer style. Mountain districts of the South Island, 3000–4500 ft. This is a well-marked plant, which Mr. Kirk described as “sub-species *plebeius*,” quoting *R. plebeius*, R. Br., as a synonym. But this I feel sure is a mistake, for it does not at all agree either with descriptions or specimens of *R. Brown*’s plant.

Var. **stoloniferus**, Kirk, l.c.—Small. Stems very slender, procumbent and rooting at the nodes. Leaves 3-fid. Flowers and fruit very small. Damp sub-alpine localities in the South Island, not uncommon.

21. **R. recens**, T. Kirk, *Students’ Fl.* 13.—Short, stout, depressed, seldom more than $1\frac{1}{2}$ in. high, sparingly clothed with stiff white hairs, especially on the petioles and upper surfaces of the leaves. Rootstock stout, with long stringy rootlets, often branched above. Leaves all radical, rosulate, thick and coriaceous; petioles broadly sheathing at the base, flattened, $\frac{1}{4}$ –1 in. long; blade ovate or rounded in outline, more or less deeply 3-lobed or trifoliate, segments or leaflets irregularly cut and lobed, acute or obtuse. Scape very short and often almost absent, usually hispid with white hairs. Flowers minute, $\frac{1}{3}$ in. diam. Sepals 5, linear or linear-oblong, acute. Petals 5, hardly longer than the sepals, linear-spathulate, obtuse at the tip, gland just below the middle. Achenes ovate-orbicular, red-brown when ripe, slightly compressed; margin thickened, blunt; face minutely pitted; style very short, stout, minutely hooked at the tip.

NORTH ISLAND: Taranaki—Moist places on sandhills near Hawera, T. F. C. SOUTH ISLAND: Otago—*Buchanan*! *Petrie*! (Herb. Kirk); sandhills near Fortrose, Southland, B. C. Aston! H. J. Matthews! (Herb. Petrie). Probably not uncommon, but easily overlooked.

A very curious little species. The type specimens in Kirk’s herbarium are very imperfect, and in fruit only. Those in Petrie’s herbarium, collected by Aston and H. J. Matthews, show both flower and fruit, and have enabled me to draw up a more complete description. My own specimens, collected at Hawera more than fifteen years ago, have smaller and less divided leaves, but the habit is the same, and the achenes exactly match those of the southern plant. Mr. Kirk was in error in supposing the species to be alpine. All the specimens I have seen have been obtained from sandhills near the sea.

22. **R. Kirkii**, *Petrie in Trans. N.Z. Inst.* xix. (1887) 323, and xxxi. 352, t. 25.—Slender, sparingly covered with soft white hairs, 3–6 in. high. Rootstock stout, with numerous thick fleshy roots. Radical leaves on long slender petioles 1–3 in. long; blade

sometimes linear-spathulate and entire, but usually 3-foliolate; leaflets stalked, rounded-ovate, entire or 3-lobed, coriaceous. Scapes several, simple or branched, 3-5 in. high; cauline leaves or bracts few, spathulate. Flowers small. Sepals 5, oblong-lanceolate. Petals 5, linear-oblong, rounded at the tip, clawed at the base, with a gland just above the claw. Achenes few, slightly compressed, keeled; style subulate, hooked at the tip.—*Kirk, Students' Fl.* 15 (in part only).

STEWART ISLAND: Swamps at Paterson's Inlet, &c., *Petrie! G. M. Thomson! Kirk!*

More specimens of this species are required to fully determine its systematic position and relationships. I have confined it to the Stewart Island plant, for the specimens from the mountains of the South Island, included by Mr. Kirk, differ in several characters of importance, and are better reserved for further inquiry. The figure given in the *Trans. N.Z. Inst.*, Vol. xxxi., is not characteristic of any specimens I have seen.

23. *R. lappaceus*, *Smith in Rees' Cyclop.* xxix. n. 61.—Short, stemless, more or less hairy or villous, 2-10 in. high. Rootstock short, stout, sometimes branched at the top. Leaves numerous, usually all radical, on petioles $\frac{1}{2}$ -3 in. long; blade $\frac{1}{4}$ -1 $\frac{1}{2}$ in. diam., cuneate or ovate or rounded in outline, sometimes entire or coarsely toothed, but more frequently 3-5-lobed or -partite, less commonly 3-foliolate or pinnately divided; lobes or segments generally toothed or crenate. Scapes 1 to many, usually leafless and 1-flowered, 1-9 in. high, generally much longer than the leaves, densely clothed with spreading or appressed hairs. Flowers very variable in size, often a rich golden-yellow. Sepals 5, pilose, spreading. Petals 5, obovate; gland at the base. Achenes forming a small rounded head, compressed or rarely slightly turgid, glabrous, margined; style short, recurved.—*Hook. f. Fl. Tasm.* i. 6; *Handb. N.Z. Fl.* 7; *Benth. Fl. Austral.* i. 12; *Kirk, Students' Fl.* 15.

Var. *macrophyllus*, *Kirk, Students' Fl.* 15.—Larger. Leaves with petioles 2-4 in. long; blade $\frac{3}{4}$ -1 $\frac{1}{2}$ in. diam., obscurely 3-lobed; margins crenate or toothed. Scapes 3-8 in. high. Flowers large.

Var. *multiscapus*, *Hook. f. Handb. N.Z. Fl.* 7.—Petioles shorter, $\frac{1}{4}$ -1 $\frac{1}{2}$ in. long; blade smaller, $\frac{1}{4}$ - $\frac{3}{4}$ in. diam., ovate or rounded, cuneate at the base, toothed or 3-lobed or 3-partite. Scapes numerous.—*R. multiscapus*, *Hook. f. Fl. Nov. Zel.* i. 9, t. 5. *R. muricatus*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 381 (still smaller, with the leaves occasionally entire).

Var. *pimpinellifolius*, *Benth. Fl. Austral.* i. 12.—Leaves usually pinnate, with 5 short and broad 3-5-lobed segments.—*R. pimpinellifolius*, *Hook. Journ. Bot.* i. 243; *Ice Plant.* t. 260.

Var. *villosus*, *Kirk, Students' Fl.* 15.—1-3 in. high, densely villous or silky in all its parts. Scape usually shorter than the leaves. Achenes slightly turgid.

NORTH, SOUTH, AND STEWART ISLANDS: The var. *multiscapus* abundant from Hawke's Bay and Taupo southwards, and ranging from sea-level to 4500 ft. November-March. The remaining varieties not uncommon in mountain districts in the South Island.

R. lappaceus is probably the most variable of the New Zealand *Ranunculi*, and certainly the most difficult to characterize. The above arrangement of its forms is mainly that given by Kirk, with the addition of the Tasmanian variety *pimpinellifolius*, which occurs in several places in the mountains of the South Island. But the student must bear in mind that the distinctions used to separate the so-called varieties are purely arbitrary, every one of them being connected with the others by numerous intermediates. It is often difficult to separate some of the aberrant forms from the allied species, particularly from *R. foliosus*, when, as sometimes happens, the scape is branched, and the peduncles shorter than the leaves. *R. plebeius* can generally be distinguished by its greater size, more divided leaves, branched flowering-stem, and reflexed sepals.

24. *R. foliosus*, *T. Kirk, Students' Fl.* 14.—Stout or slender, 4–12 in. high, more or less hirsute with long soft tawny hairs, especially on the scapes and petioles. Rootstock short, stout. Stems or branches often numerous, erect or decumbent, leafy. Radical leaves numerous, on long petioles 3–6 in. long, with broad sheathing bases; blade $\frac{1}{2}$ – $1\frac{1}{2}$ in. diam., variable in outline, obovate or ovate or rounded, cuneate or rounded at the base, rarely reniform with a cordate base, coarsely toothed or incised, or 3-lobed with the lobes again toothed or cut, both surfaces covered with long soft appressed hairs. Cauline leaves often opposite, or clustered towards the tops of the stems, like the radical but smaller and on shorter petioles. Peduncles variable, always shorter than the leaves; in large specimens some often spring from among the radical leaves, and are 3–6 in. high; others from the axils of the cauline leaves, and are seldom more than $\frac{1}{2}$ –3 in. Flower $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. or more. Sepals 5, oblong, spreading. Petals 5, narrow-oblong, with a gland near the base. Achenes smooth, somewhat turgid, hardly compressed; style short, subulate.

SOUTH ISLAND: Nelson — Fowler's Pass, *Kirk!* near Lake Tennyson, *T. F. C.* Canterbury—Broken River, *T. F. C.*; Hopkins River, *Haast*; Tasman Valley, *T. F. C.* Westland—Otira Gorge, *Cockayne!* Teremakau, *Petrie.* Otago—Mountain valleys of the interior, not uncommon, *Petrie!* Altitudinal range 1000–4000 ft. December–March.

An exceedingly variable plant, but on the whole readily distinguished by the branched stems and leafy habit, opposite or clustered cauline leaves often with very broad sheathing bases, short stout peduncles which are much shorter than the leaves, and the somewhat turgid or but slightly compressed achenes. Mr. Kirk's type specimens are small and in poor condition, and do not represent the usual state of the species.

25. *R. subscaposus*, *Hook. f. Fl. Antarct.* i. 5.—Erect or nearly so, 6–18 in. high, more or less covered in all its parts with short rigid appressed fulvous hairs. Rootstock short, stout. Radical leaves on slender petioles 3–6 in. long; blade deltoid-cordate in outline, 1 – $1\frac{1}{2}$ in. diam., 3-partite to the base; segments cuneate, more or less deeply and irregularly 3–7-toothed or -lobed, lobes acute. Cauline leaves few, similar. Scape or stem shorter or longer than the leaves, 1–3-flowered. Flowers small, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. Sepals 5, spreading, hispid. Petals 5, narrow-oblong,

rather longer than the sepals in the only perfect flower I have seen; gland a little below the middle. Achenes forming a rather large rounded head, compressed, margined, with a stout slightly hooked style.—*Handb. N.Z. Fl.* 7; *Kirk, Students' Fl.* 15.

CAMPBELL ISLAND: Apparently rare, *Dr. Lyall* (Antarctic Expedition), *Lieut. Rathouis!* *Dr. Filhol!* *Kirk!*

A specimen in my possession collected by *Dr. Filhol*, of the French Transit of Venus Expedition, almost exactly matches a drawing taken from the type specimen at Kew. *Mr. Kirk's* specimens are much taller and more slender, with long petioles and a flowering-stem much exceeding the leaves, but evidently belong to the same species. It is probably a variable plant, and better specimens are required to furnish a good description. Its nearest ally is *R. hirtus*, from which it differs in the short rigid pubescence, in the leaves, in the sepals not being reflexed, and in the larger heads of achenes, which are more turgid and have much stouter beaks.

26. *R. Hectori*, *T. Kirk, Students' Fl.* 16.—Erect, 6–15 in. high, whole plant more or less clothed with strigose or appressed hairs. Rootstock short. Leaves chiefly radical, reticulate above when fresh, fleshy, hairy on both surfaces; petioles 4–7 in. long, slightly sheathing at the base; blade 1–1½ in. long and broad, ovate-orbicular, 3-lobed to below the middle, truncate or slightly cordate at the base, lobes acute or subacute. Scapes 1–2; peduncles 2 or 3. Cauline leaves petiolate, 3-partite, the segments sparingly lobed or toothed. Receptacle ovate or conical, papillose, sparingly hairy. Flowers not seen. Achenes glabrous, narrowed below, oblique, slightly turgid, faintly keeled or margined; style shortly subulate, slightly recurved.

AUCKLAND ISLANDS: *Sir James Hector!*

This is based on a single very imperfect specimen in *Mr. Kirk's* herbarium, and in the absence of additional information I have reproduced his description. It is probably a mere state of *R. aucklandicus* with longer petioles and a branched scape.

27. *R. aucklandicus*, *A. Gray, Bot. U.S. Expl. Exped.* i. 8.—Rather stout, 6–12 in. high, strigose-hirsute in all its parts. Rootstock short, stout. Radical leaves on petioles 3–6 in. long, sheathing at the base; blade 1–1½ in. diam., rounded-reniform in outline, silky-strigose on both surfaces, 3-cleft to or beyond the middle, with the sinuses usually closed; lobes broadly cuneate, again 2–3-lobed or coarsely cut and incised. Scapes 1–3, rather stout, 6–10 in. high, 1-flowered, usually with 1–2 cauline leaves towards the base. Flowers not seen. Fruiting-receptacle ¼ in. long, cylindric or club-shaped, papillose, hairy. Achenes ovate, compressed, not margined; style subulate, short, straight.—*Hook. f. Handb. N.Z. Fl.* 723; *Kirk, Students' Fl.* 16.

AUCKLAND ISLANDS: *U.S. Exploring Expedition, Kirk!*

In habit approaching very near to some forms of *R. lappaceus*, but its nearest ally is undoubtedly *R. subscaposus*. I suspect that it and the two preceding are varieties of one species, but to prove this much more complete material will be required.

28. **R. Cheesemanii**, *T. Kirk, Students' Fl.* 17.—Stems much branched, stout, grooved, prostrate, often rooting at the nodes, sparingly strigose-pubescent, especially on the leaf-sheaths. Radical and cauline leaves alike; petioles very short, broadly sheathing at the base; blade $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., broadly cuneate, 3-lobed or -toothed at the tip; surfaces glabrous or nearly so. Peduncles axillary, $\frac{1}{2}$ –1 in. long. Flowers not seen. Fruiting-receptacle small, glabrous, papillose. Achenes few, turgid, glabrous; style short, straight or hooked.

SOUTH ISLAND: Nelson—Fowler's Pass, 3000 ft., in places where water has stagnated, *Kirk!*

A very curious little plant. Although so dissimilar in general appearance, I have little doubt that it is a mere state of *R. foliosus*, which often shows a tendency to creep, and with which it agrees in the position of the peduncles, achenes, &c.

29. **R. ternatifolius**, *T. Kirk in Trans. N.Z. Inst.* x. (1878) App. 29.—Slender, sparingly pilose with long weak hairs, 1–4 in. high. Stems or branches numerous, long, weak, procumbent or prostrate, often rooting at the nodes, sometimes interlaced and matted. Leaves on long slender petioles 1–3 in. long; blade 3-foliolate or 3-ternate, primary leaflets on long petiolules, segments small, entire or 3-lobed, acute. Peduncles $\frac{1}{4}$ –1 in. long, usually on the branches opposite the leaves. Flowers minute, $\frac{1}{8}$ – $\frac{1}{4}$ in. diam. Sepals 5, ovate, pilose, membranous. Petals 5, linear-oblong, clawed at the base, with a single gland above the claw. Achenes 5–10, slightly compressed, glabrous; style short, stout, hooked at the tip.—*Students' Fl.* 18. *R. trilobatus*, *Kirk in Trans. N.Z. Inst.* ix. 547 (not of Kit.).

SOUTH ISLAND: Canterbury—Source of the Broken River, *T. F. C.* Otago—Swampy Hill, Port Molyneux, Catlin's River, *Petrie!* Makarewa, Winton, Centre Hill, *Kirk!* Sea-level to 3500 ft. December–February.

30. **R. depressus**, *T. Kirk in Trans. N.Z. Inst.* xii. (1880) 393.—Small, depressed, rarely more than $1\frac{1}{2}$ in. high, more or less clothed with long straight hairs, usually forming matted patches. Root-stock short, often giving off short stolons, in large specimens sometimes branched at the top. Leaves numerous, all radical, on decurved petioles $\frac{1}{2}$ – $1\frac{1}{2}$ in. long with broad sheathing bases; blade very variable in size and cutting, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, ovate in outline, usually trifoliolate with the leaflets ternately or pinnately cut into narrow-linear segments, sometimes less divided, 3-lobed with broader segments, or occasionally nearly entire. Scapes stout, much shorter than the leaves, 1-flowered. Sepals 5, ovate, membranous. Petals 5, oblong, slightly exceeding the sepals, with a gland just above the base. Carpels few, 4–8, hidden among the leaves, ovate, slightly turgid; style very minute.—*Kirk, Students' Fl.* 17.

Var. **glabratus**, *Kirk, l.c.*—Smaller and nearly glabrous. Leaves minute, 3-lobed, lobes flat, acutely pointed. Achenes smaller.

SOUTH ISLAND: Canterbury—Swamps in the Broken River basin, *Enys*! *Kirk*! *T. F. C.*; Tasman Valley, *T. F. C.* Otago—Mount Cardrona, *Petrie*! Altitudinal range from 2000 to 5000 ft.

I am indebted to Mr. Enys for an instructive series of specimens, all collected in one locality, showing passage-forms of leaves, from trilobate with entire lobes to trifoliate with almost multifid leaflets. In Mr. Petrie's Mount Cardrona plant the leaves are trilobate, with the lobes entire or toothed, and the habit is somewhat different; but it is in young flower only, and more advanced specimens are required to prove its exact position with respect to the typical state.

31. *R. pachyrrhizus*, *Hook. f. Handb. N.Z. Fl.* 8.—Small, stout, much depressed, forming dense patches seldom more than $1\frac{1}{2}$ in. high, more or less clothed with long soft hairs. Rootstock stout, fleshy, creeping, branched; rootlets thick and stringy. Leaves crowded at the ends of the divisions of the rootstock, all radical, small, somewhat fleshy; petioles stout, flattened, $\frac{1}{4}$ – $\frac{1}{2}$ in. long; blade $\frac{1}{4}$ – $\frac{3}{4}$ in. diam., cuneate or obovate-cuneate, with 3–5 acute or obtuse teeth or lobes. Scape short, stout, 1-flowered, $\frac{1}{4}$ –1 in. high. Flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. Sepals 5, silky, linear-oblong, membranous. Petals 8–15, linear-obovate, with 1 or sometimes 3 glands a little distance above the base. Receptacle hairy. Achenes forming a globose head $\frac{1}{3}$ in. diam., turgid, rounded, glabrous or with a few long weak hairs; style stout, subulate.—*Kirk, Students' Fl.* 19.

SOUTH ISLAND: Otago—Lake district, *Hector* and *Buchanan*! Old Man Range, *Hector* Mountains, Mount Pisa, Mount Cardrona, Mount Tyndall, *Petrie*! Altitudinal range 4000–7000 ft. January–March.

A singular little plant, of very peculiar habit and appearance. It is not allied to any other species of the creeping section of the genus, and would perhaps have been better placed in the vicinity of *R. sericophyllus*.

32. *R. macropus*, *Hook. f. in Hook. Ic. Plant.* t. 634.—Perfectly glabrous, smooth and succulent, 6–18 in. high. Stems long, fistulose, creeping and rooting at the nodes. Radical leaves on petioles varying in length from 4–18 in.; blade 1–2½ in. in diam., semicircular, flabellate or reniform in outline, 3–5-partite to the base; leaflets broad or narrow-cuneate, more or less deeply and irregularly lobed or cut, lobes toothed at the tips. Flowering-stem about as long as the radical leaves, bearing 2 or 3 small cauline leaves, opposite to each of which springs a long or short 1-flowered peduncle. Flowers small, seldom more than $\frac{1}{2}$ in. diam. Sepals 5, oblong or obovate. Petals 5, longer or shorter than the sepals; gland basilar. Achenes forming a small globose head, turgid, glabrous; style long, subulate.—*Handb. N.Z. Fl.* 7; *Kirk, Students' Fl.* 17. *R. longipetiolatus*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 325.

NORTH AND SOUTH ISLANDS: Not uncommon in swamps in lowland districts from the Kaipara River to the south of Otago. December–January.

The usual form of this species, with very long petioles and broad leaf-segments, has a very distinct appearance; but small varieties are difficult to distinguish from *R. rivularis*, var. *major*. Mr. Colenso's *R. longipetiolatus*, judging from the specimens in his herbarium, cannot be separated even as a variety.

33. *R. rivularis*, Banks and Sol. ex Forst. Prodr. n. 524.—Smooth, perfectly glabrous in all its parts. Stems creeping, often branched and forming broad matted patches, rooting at the nodes and giving off tufts of radical leaves and erect peduncles or weak sparingly branched flowering-stems, or floating and irregularly branched. Leaves on slender petioles 1–6 in. long; blade $\frac{1}{4}$ – $1\frac{1}{2}$ in. diam., ovate semicircular or reniform in outline, usually 3–7-partite to the base; segments varying from cuneate to narrow-linear, more or less deeply cut at the apex, sometimes to the middle, occasionally ternatisect, rarely entire. Peduncles usually longer than the leaves. Flowers yellow, $\frac{1}{4}$ – $\frac{3}{4}$ in. diam. Sepals 5, spreading. Petals 5–10, linear-oblong, usually longer than the sepals; gland some distance above the base. Achenes turgid, glabrous, sometimes rugose from the shrivelling of the epicarp; style rather long, subulate, straight or recurved.—*A. Cunn. Precur.* n. 630; *Raoul, Choix de Plantes*, 47; *Hook. f. Fl. Nov. Zel.* i. 11; *Handb. N.Z. Fl.* 8; *Kirk, Students' Fl.* 18.

Var. *major*, Benth. *Fl. Austral.* i. 14.—Suberect, 3–12 in. high. Leaves tufted; segments often very narrow and much cut.—*R. incisus*, *Hook. f. Fl. Nov. Zel.* i. 10, t. 4. *R. amphitricha*, Colenso in *Trans. N.Z. Inst.* xvii. (1885) 237.

Var. *subfluitans*, Benth. *l.c.*—Creeping or partially floating. Leaves smaller, less divided. Flowers and achenes smaller.—*R. inundatus*, *R. Br. ex D.C. Syst.* i. 269; *Hook. f. Fl. Tasm.* i. 8.

Var. *inconspicuus*, Benth. *l.c.*—Smaller, more slender, suberect. Leaf-segments 3 fid. Flowers smaller.—*R. inconspicuus*, *Hook. f. Fl. Tasm.* i. 8, t. 2B.

NORTH, SOUTH, STEWART, AND CHATHAM ISLANDS: Common in swamps and streams, &c., ascending to 2500 ft. Var. *inconspicuus*: Pencarrow Lagoon, near Wellington, *Kirk!* Otago, *Petrie!* October–March. Also plentiful in Australia.

A most abundant little plant, exceedingly variable in most of its characters, and particularly so in the extent to which the leaves are divided, and the width or narrowness of the ultimate segments. Stock-owners consider it to be highly poisonous, and attribute to it many deaths occurring among cattle feeding in swamps in dry summers.

34. *R. acaulis*, Banks and Sol. ex D.C. *Syst.* i. 270.—Small, dark-green, fleshy, perfectly glabrous, sending out creeping stolons and often forming broad matted patches. Leaves all radical, on slender petioles 1–3 in. long; blade $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., trifoliate or deeply 3-lobed; leaflets or segments sessile, obovate or oblong, obtuse, entire or 2–3-lobed. Scapes shorter than the leaves, naked, 1-flowered. Flowers small, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Sepals 5, roundish-ovate,

membranous. Petals 5-8, spathulate, with a single gland near the middle. Achenes forming a small rounded head $\frac{1}{3}$ in. diam., turgid, glabrous; style short, subulate, straight or nearly so.—*A. Cunn. Precur.* n. 631; *Raoul, Choix de Plantes*, 47; *Hook. f. Fl. Antarct.* i. 4, t. 2; *Fl. Nov. Zel.* i. 11; *Handb. N.Z. Fl.* 8; *A. Gray, Bot. U.S. Exped.* 7; *Kirk, Students' Fl.* 18. *R. stenopetalus*, *Hook. Ic. Plant.* t. 677.

NORTH, SOUTH, AND STEWART ISLANDS: Sandy beaches and muddy shores, not uncommon. AUCKLAND ISLANDS: *Hooker*, &c. CHATHAM ISLANDS: *Buchanan*. Only known inland on the shores of Lakes Rotorua, Tarawera, and Taupo. September–November. Also found in southern Chili.

A distinct little species, easily recognised by its creeping and matted habit, trifoliolate leaves with nearly entire leaflets, short scapes, and spathulate petals. Mr. Colenso's herbarium contains no specimens of his *R. uniflorus* (*Trans. N.Z. Inst.* xxxi. (1896) 267). The description agrees with *R. acaulis* in most points, but the plant is said not to be stoloniferous, and to possess a sheathing bract on the upper part of the scape.

35. *R. crassipes*, *Hook. f. Fl. Antarct.* ii. 224, t. 81.—Smooth, glabrous, succulent, stems creeping and rooting at the nodes. Leaves on petioles 1-4 in. long; blade cordate-reniform in outline, $\frac{1}{3}$ -1 in. diam. or more, 3-lobed or 3-partite; segments variable in shape, broad or narrow, cuneate at the base, deeply and irregularly toothed. Peduncles axillary, stout, erect, shorter than the leaves. Flowers small, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam. Sepals 4-5, ovate, obtuse, membranous. Petals the same number, slightly longer than the sepals, obovate-spathulate, with a gland a little below the middle. Achenes forming a rounded head $\frac{1}{3}$ in. diam., broadly ovate, turgid; style short, straight.—*Kirk, Students' Fl.* 17.

MACQUARIE ISLAND: *A. Hamilton*! Also found in Kerguelen's Island.

The closely allied *R. biternatus*, Smith, from Fuegia, the Falkland Islands, and Marion Island, may possibly occur in Macquarie Island or the Auckland Islands. It can be recognised at once by its biternate leaves.

36. *R. Limosella*, *F. Muell. ex Kirk in Trans. N.Z. Inst.* iii. (1871) 177.—Small, slender, perfectly glabrous. Stems filiform, creeping and rooting at the nodes, often forming matted patches. Leaves solitary or in tufts of 2-3 at the nodes, $\frac{1}{2}$ -3 in. long, very narrow linear, usually dilated at the tip and subspathulate, obtuse, nerveless. Peduncles filiform, axillary, solitary, much shorter than the leaves. Flowers minute, $\frac{1}{5}$ in. diam. Sepals 4, rounded-ovate, membranous. Petals 4, much longer than the sepals, narrow-linear, revolute at the tip; gland some little distance above the base. Achenes 8-12, rounded, somewhat turgid; style long, slender, recurved.—*Kirk, Students' Fl.* 19. *R. limoselloides*, *F. Muell. ex Hook. f. Ic. Plant.* t. 1081.

NORTH ISLAND: Auckland—Lakes in the middle Waikato, *Kirk*! *T. F. C. Taranaki*—Between Opunake and Normanby, *Kirk*. SOUTH ISLAND: Canterbury—Swamps and lakes in the middle Waimakariri district, *Kirk*! *Enys*!

T. F. C. Otago—Maniototo Plains, Roxburgh, *Petrie!* *E. W. Bastings!* In muddy and watery places, often submerged. Altitudinal range from sea-level to 3000 ft. December–April.

A very peculiar little species, readily known by the narrow-linear spatulate leaves and minute tetramerous flowers. Sir J. D. Hooker has compared it with the Falkland Islands *R. hydrophilus*, and with *R. Moseleyi* from Kerguelen's Islands, so far as habit and leaves are concerned. In the flowers and fruit it differs largely from both.

37. *R. parviflorus*, Linn. *Sp. Plant.* 780; var. *australis*, Benth. *Fl. Austral.* i. 14.—A small slender hairy annual, with sparingly branched suberect or decumbent stems 2–5 in. long. Leaves small, radical and cauline, on slender petioles $\frac{3}{4}$ –1½ in. long; blade thin and membranous, orbicular in outline, 3–5-toothed or -lobed, sometimes divided to the base. Flowers very minute, on the branches opposite the leaves, sessile or nearly so. Sepals fugacious. Petals 4–5, slightly longer than the sepals. Mature achenes 3–6, compressed, margins thin, sides covered with minute tubercles; style very short, hooked at the tip.—*Hook. f. Handb. N.Z. Fl.* 8; *Kirk, Students' Fl.* 20. *R. sessiliflorus*, *R. Br. ex D.C. Syst.* i. 302; *Hook. f. Fl. Nov. Zel.* i. 11.

NORTH ISLAND: Sheltered places on lava-streams, Mount Wellington and Mount Eden, &c., Auckland Isthmus; once very plentiful, but now becoming rare. Originally discovered by Mr. Colenso. September–November.

A common Australian plant, and possibly introduced from thence in the very early days of the colony. The typical state of the species, which is a much larger and stouter plant, with a very different aspect, has become naturalised in fields and waste places throughout the colony.

4. *CALTHA*, Linn.

Glabrous tufted perennial herbs; rootstock creeping. Leaves all or chiefly radical, oblong, ovate or rounded, cordate at the base or 2-lobed with the lobes turned upwards. Scape 1- or few-flowered. Sepals 5 or more, petaloid, usually deciduous. Petals wanting. Stamens numerous. Carpels several, sessile; ovules several or many, attached in 2 series to the ventral suture. Follicles 6 or more in a head, spreading, several- or many-seeded, opening along the inner face.

A small genus of 8–10 species, found in the temperate regions of both hemispheres. The southern species belong to the section *Psychrophila*, distinguished by the turned-up basal lobes or auricles of the leaves. Both the New Zealand species are endemic, although closely allied to the Australian and Tasmanian *C. introloba*.

Leaves entire or sinuate. Flowers yellow. Sepals linear-subulate, tapering from the base into almost caudate points

1. *C. novæ-zealandicæ*.

Leaves dentate. Flowers white. Sepals oblong, obtuse or subacute, broadest above the middle

2. *C. obtusa*.

1. *C. novæ-zealandiæ*, Hook. f. *Fl. Nov. Zel.* i. 12, t. 6.—A perfectly glabrous perennial herb 1–6 in. high. Rootstock stout, with fleshy rootlets. Leaves all radical, spreading; petiole variable in length, $\frac{1}{2}$ –4 in., grooved, base dilated, membranous, sheathing the stem; lamina $\frac{1}{3}$ –1 in. long, ovate-oblong, entire or sinuate, notched at the apex, deeply 2-lobed at the base, the lobes (auricles) turned upwards and almost appressed to the surface of the leaf. Scape solitary, naked, 1-flowered, $\frac{1}{2}$ –5 in. long, short at first but lengthening as the fruit ripens. Flowers pale-yellow, sweet-scented, $\frac{1}{2}$ –1 in. diam. Sepals 5–7, narrow, linear-subulate, tapering from the base into an almost caudate point, 3-nerved. Stamens 15–20. Carpels 6–12, ovate, narrowed into a short stout style. Follicles spreading, with a short hooked style; seeds few, 2–5.—Hook. f. *Handb. N.Z. Fl.* 9; Kirk, *Students' Fl.* 21. *C. marginata*, Col. in *Trans. N.Z. Inst.* xxiii. (1891) 382.

NORTH ISLAND: Ruahine Mountains, Colenso! Tararua Mountains, Buchanan, Townson! SOUTH ISLAND: Not uncommon on the higher mountains as far south as Stewart Island. Altitudinal range 2500 to 5500 ft. October–January.

2. *C. obtusa*, Cheesem. in *Trans. N.Z. Inst.* xxxiii. (1901) 312.—Smaller than *C. novæ-zealandiæ*, seldom more than 2 in. high. Leaves smaller; blade broader, wide-ovate or almost rounded, coarsely dentate, notched at the apex, 2-lobed at the base, lobes turned upwards and appressed to the surface, toothed. Flowers white, $\frac{1}{2}$ in. diam., at first sessile among the uppermost leaves, but the scape elongates in fruit. Sepals 5, oblong, obtuse or subacute, broadest above the middle. Stamens 10–15. Carpels 5–8, narrow-ovate; style long, slender. Ripe fruit not seen.

NORTH ISLAND: *Herb. Colenso!* (probably from the Ruahine Range, but without locality or collector's name). SOUTH ISLAND: Mountains at the head of the Broken River, Canterbury, 5000–6000 ft., T. F. C. Otago—Mount St. Bathian's and Dunstan Mountains, 5000–6000 ft., Petrie! Black Peak, 6000 ft., Buchanan!

The white flowers and blunt oblong sepals distinguish this at once from *C. novæ-zealandiæ*, but in a flowerless state it is easily mistaken for a dwarf form of that plant, although the leaves are always broader and coarsely dentate. The sepals are markedly different from the long tapering almost caudate sepals of *C. novæ-zealandiæ*. I have not been able to compare it with the Australian and Tasmanian *C. introloba*, F. Muell., which is said to have white flowers, but judging from descriptions it can hardly be the same.

ORDER II. MAGNOLIACEÆ.

Trees or shrubs, often aromatic. Leaves alternate, entire or toothed, stipulate or exstipulate. Flowers axillary or terminal, solitary or fascicled, often large. Sepals 3, seldom more, deciduous. Petals 3–6, in several rows, hypogynous, imbricate in the bud. Stamens indefinite, hypogynous; anthers adnate. Carpels either many and imbricated on an elongated receptacle, or few in a single

whorl on a flat receptacle, always 1-celled. Ovules 2 or several, attached to the ventral suture. Ripe carpels either dry and follicular, or succulent and berried, rarely woody. Seeds solitary or several; embryo minute, at the base of copious albumen.

A small order, mainly found in eastern and tropical Asia and North America. Genera 11; species about 80. Some of the species of *Magnolia* are strikingly beautiful in both flowers and foliage, and must rank among the finest known trees. The sole New Zealand genus is a somewhat anomalous member of the order, belonging to the tribe *Winteraceæ*, characterized by the exstipulate leaves, polygamous flowers, and the carpels few in number in a single whorl.

1. DRIMYS, Forst.

Glabrous and aromatic trees and shrubs, usually of small size. Leaves alternate, exstipulate, marked with pellucid dots. Flowers small. Calyx cupuliform in the New Zealand species, the margin shortly and irregularly toothed or lobed, or entire. Petals 5 or 6 or more, in 2 or more whorls, spreading. Stamens with the filaments thickened above; anther-cells diverging. Carpels 1 to several; ovules few or many. Fruit of one or several indehiscent berries.

A small genus of 10 or 12 species, found in South America, New Zealand, Australia, New Caledonia, New Guinea, and Borneo. The three New Zealand species are all endemic.

- | | |
|--|--------------------------|
| Large shrub or small tree. Bark black. Leaves 2-5 in., not blotched. Fascicles 3-10-flowered | 1. <i>D. axillaris</i> . |
| Large shrub or small tree. Bark black. Leaves 1½-2½ in., blotched with red. Fascicles 2-4-flowered | 2. <i>D. colorata</i> . |
| Small compact shrub, 3-5 ft. high. Bark reddish-yellow, rugose. Leaves ½-1 in.; petioles appressed. Flowers solitary or two together | 3. <i>D. Traversii</i> . |

1. *D. axillaris*, Forst. *Char. Gen.* t. 42.—A small tree 12-25 ft. in height, rarely more; bark black. Leaves 2-5 in. long, on short petioles, elliptic-ovate or elliptic-oblong, obtuse, coriaceous or rarely submembranous, green on both surfaces or glaucous below, not blotched. Flowers small, greenish-yellow, in fascicles of 3-10 in the axils of the leaves, or from the scars of fallen leaves; pedicels $\frac{1}{4}$ - $\frac{3}{4}$ in. long. Calyx cupular, with 2-6 irregular shallow lobes or notches. Petals 5-6, linear, spreading. Stamens 6-15, in 3 series. Carpels 3-5. Berries 2 or 3, about the size of a peppercorn; seeds 3-6, black, angular. — *A. Rich. Fl. Nouv. Zel.* 290; *A. Cunn. Precur.* n. 629; *Raoul, Choix de Plantes*, 47; *Hook. f. Fl. Nov. Zel.* i. 12; *Handb. N.Z. Fl.* 10; *Kirk, Forest Fl.* t. 1; *Students' Fl.* 22. *Wintera axillaris*, Forst. *Prodr.* n. 229.

NORTH AND SOUTH ISLANDS: Not uncommon in forests from Ahipara to Banks Peninsula. Altitudinal range from sea-level to 2800 ft. *Horopito*. October-December.

Aromatic and pungent, but not so much so as the following species. The wood is serviceable for inlaving, and a decoction of the bark is occasionally used by country settlers as an astringent.

2. **D. colorata**, *Raoul, Choix de Plantes*, t. 23.—Very similar to the preceding, and merged with it by Hooker in the Handbook. It is usually smaller and more compactly branched; and the leaves are shorter, $\frac{1}{2}$ – $2\frac{1}{2}$ in. long, more coriaceous, yellowish-green blotched with red, usually more glaucous below. Fascicles 2–4-flowered; peduncles much shorter. Calyx shallowly cup-shaped, often quite entire. Carpels 2–4, but it is seldom that more than 2 ripen. Seeds 2–3.—*D. axillaris*, var. *colorata*, *Kirk, Forest Fl.* t. 2; *Students' Fl.* 22.

NORTH, SOUTH, AND STEWART ISLANDS: Not uncommon from the Patetere Plateau and Rotorua southwards. Very abundant in Stewart Island, where it descends to sea-level. November–December.

I have considerable hesitation in re-establishing this as a species. It is certainly very close to the preceding, and in the dried state it is often difficult to separate the two. But in the field it can always be readily distinguished, and all my correspondents regard it as distinct. The two species grow intermixed in many localities in the Wellington and Nelson Districts.

3. **D. Traversii**, *T. Kirk in Trans. N.Z. Inst.* xxx. (1898) 379.—A compact closely-branched shrub, 3–6 ft. high. Branches stout; bark reddish or reddish-yellow, rough and wrinkled, almost verrucose, sometimes viscid. Leaves numerous, close-set and often overlapping, $\frac{3}{4}$ –1 in. long, oblong-obovate or obovate-spathulate, obtuse, thick and coriaceous, glaucous below, margins slightly thickened; petiole short, stout, appressed. Flowers small, axillary, 1 or 2 together; pedicels short. Calyx saucer-shaped, entire. Petals 5, linear-oblong, obtuse. Stamens usually 5. Carpel solitary (always?), obovate. Berry small, globose-depressed; seeds 3–6.—*Hymenanthera Traversii*, *Buch. in Trans. N.Z. Inst.* xv. (1883) 339, t. 28.

SOUTH ISLAND: Western part of the Nelson Province; near Collingwood, *H. H. Travers!* Medora Creek, Wakamarama Range to the Goulard Downs, alt. 2000–3000 ft., *J. Dall*; Mount Rochfort, near Westport, *W. Townson!*

A very curious and distinct species, by far the smallest of the genus.

ORDER III. CRUCIFERÆ.

Herbs, very rarely undershrubs, with pungent watery juice. Leaves alternate, entire lobed or pinnately divided, the lower ones often forming a rosette at the base of the stem; stipules wanting. Flowers perfect, in terminal racemes, which are often short and corymb-like when the flowering commences, but lengthen out as it advances, usually without bracts. Sepals 4, free, deciduous. Petals 4, free, hypogynous, placed cross-wise. Stamens 6, 2 of them shorter than the other 4; sometimes reduced to 4 or even 2 (*Lepidium*). Ovary usually 2-celled; style short or wanting; stigma entire or 2-lobed. Ovules few or numerous. Fruit a pod, long or short, usually divided into 2 cells by a thin partition called

the replum, from which the 2 valves fall away at maturity; more rarely the pod is indehiscent or transversely jointed. Seeds without albumen, entirely filled by the large embryo, which is variously bent or folded, the radicle either lying along the edges of the cotyledons (accumbent) or placed along the back of one of them (incumbent).

The Crucifers form a large and extremely natural family, comprising about 180 genera and between 1500 and 2000 species. The species are distributed over the whole world, but are most plentiful in the temperate regions of the Northern Hemisphere, and especially so in southern Europe and Asia Minor. They are rare in the tropics, particularly where there are no mountain-ranges. Most of them possess antiscorbutic and stimulating properties, and many are staple articles of food. Not a few of the cultivated species (and others) have become naturalised in New Zealand, as will be seen from the list of introduced plants appended to this work. Of the New Zealand genera, *Pachycladon* and *Notothlaspi* are endemic; the remainder are widely spread outside the colony.

* Pods long and narrow.

- | | |
|--|-----------------|
| Pods terete, linear-oblong, tumid. Seeds in two rows in each cell. Cotyledons accumbent | 1. NASTURTIIUM. |
| Pods flat, linear, acute; valves opening elastically from the base. Seeds in one row. Cotyledons accumbent | 2. CARDAMINE. |
| Pods terete or obtusely 4-6-angled, 1-3-nerved. Seeds in one row. Cotyledons incumbent | 3. SISYMBRIUM. |

** Pods short and broad.

- | | |
|--|-----------------|
| Alpine herb with stellate pubescence. Pods compressed, boat-shaped, not winged. Seeds 3-5 in each cell | 4. PACHYCLADON. |
| Pods compressed, oblong to obovate, valves turgid, keeled. Seeds numerous | 5. CAPSELLA. |
| Pods much compressed, ovate to orbicular, often winged. Seeds 1 in each cell | 6. LEPIDIUM. |
| Alpine herbs with sweet-scented flowers. Pods large, much compressed, obovate, very broadly winged. Seeds numerous | 7. NOTOTHLASPI. |

1. NASTURTIIUM, R. Br.

Glabrous or pubescent branched herbs. Leaves generally pinnate or pinnately lobed, sometimes entire. Flowers small, yellow or white. Sepals short, equal, spreading. Petals short, scarcely clawed. Stamens 2, 4, or 6. Stigma entire or 2-lobed. Pod almost terete, long or short; valves generally 1-nerved; septum thin, transparent. Seeds small, turgid, usually arranged in two rows; cotyledons accumbent.

A genus of between 20 and 30 species, some of them very widely dispersed, but most abundant in the temperate and warm regions of the Northern Hemisphere.

1. *N. palustre*, *D.C. Syst. ii.* 191.—A slender leafy branched herb with weak or decumbent stems 6-20 in. long, glabrous or slightly hairy. Leaves variable, usually lyrate-pinnatifid, auricled at the base with the lobes toothed or irregularly lobed, sometimes

almost entire, toothed or sinuate-lobed. Flowers small, yellow, in lax racemes. Pedicels slender, ebracteate. Petals about equalling the sepals. Pods oblong, turgid, slightly curved when ripe, $\frac{1}{8}$ – $\frac{1}{4}$ in. long. Seeds numerous, crowded, in 2 series.—*Hook. f. Handb. N.Z. Fl.* 10; *Kirk, Students' Fl.* 25. *N. terrestre*, *R. Br. in Ait. Hort. Kew.* iv. 110; *Hook. f. Fl. Nov. Zel.* i. 14. *N. semipinnatifidum*, *Hook. Journ. Bot.* i. 246. *N. sylvestre*, *A. Rich. Fl. Nouv. Zel.* 309, (*non R. Br.*); *A. Cunn. Precur.* n. 625; *Raoul, Choix de Plantes*, 47.

NORTH AND SOUTH ISLANDS: Common in moist places from the North Cape to the Bluff. Usually in lowland districts, but ascending to over 2000 ft. in the river-valleys of Canterbury and Otago. Summer and autumn. An abundant plant in the temperate portions of both hemispheres.

The common water-cress of Europe (*Nasturtium officinale*, *R. Br.*) is now plentifully naturalised throughout New Zealand. It is easily known by its aquatic habit, creeping or floating stem, pinnate leaves, and white flowers.

2. CARDAMINE, Linn.

Annual or perennial often flaccid herbs, glabrous or slightly pubescent. Leaves entire or more frequently pinnately divided. Flowers white or purplish. Sepals equal at the base. Petals clawed. Stigma simple or 2-lobed. Pod long, narrow-linear, compressed; valves usually flat, opening elastically; septum membranous, transparent. Seeds numerous, flattened, in one series; cotyledons accumbent.

A rather large genus of over 60 species, inhabiting the temperate and cool regions of both hemispheres. Of the seven species found in New Zealand one is a very widely diffused plant, another extends to Australia, the remaining five are endemic.

A. Rootstock slender, short.

Slender, usually flaccid. Leaves pinnate (reduced to a single pinnule in var. <i>uniflora</i>). Flowers small	..	1. <i>C. hirsuta</i> .
Small, depressed. Leaves all radical, spatulate. Flowers small	.. .. .	2. <i>C. depressa</i> .
Leaves all radical, pinnatifid at the base. Flowers large	.. .. .	3. <i>C. bilobata</i> .
Tall, slender, branched and leafy. Flowers in elongated racemes. Seeds pitted	.. .. .	4. <i>C. stylosa</i> .

B. Rootstock stout, fleshy, as thick as the finger, crowned with numerous rosulate radical leaves.

Flowering-stems 6–18 in. Leaves almost glabrous. Pods narrow, $\frac{1}{15}$ – $\frac{1}{12}$ in. broad	.. .. .	5. <i>C. fastigiata</i> .
Flowering-stems 6–24 in. Leaves villous. Pods broad, $\frac{1}{8}$ – $\frac{1}{4}$ in.	.. .. .	6. <i>C. latesiliqua</i> .
Flowering-stems short, 2–4 in. Leaves covered with stellate pubescence. Pods narrow	.. .. .	7. <i>C. Enysii</i> .

1. *C. hirsuta*, Linn. *Sp. Plant.* 655.—A very variable glabrous or slightly hairy annual or perennial herb, usually much branched from the base. Stems erect or decumbent, occasionally as much as

18 in. high, but usually from 6–12 in., in alpine varieties sometimes reduced to 1 in. or 2 in. Lower leaves pinnate; leaflets few, rounded or ovate, entire or toothed, usually stalked, sometimes reduced to 1. Cauline leaves few, pinnatifid with narrow segments. Flowers usually small, few or many, sometimes reduced to 1. Petals narrow, erect or slightly spreading. Stamens sometimes 4 only, especially in European specimens. Pods erect, slender, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, very narrow; style short.—*Hook. f. Fl. Nov. Zel.* i. 13; *Handb. N.Z. Fl.* 12; *Kirk, Students' Fl.* 26.

Var. **debilis**, *Hook. f. Handb. N.Z. Fl.* 12.—Erect or decumbent, often much branched. Leaflets in several pairs, rounded or cordate. Pods slender, with long slender styles.—*C. debilis*, *Banks and Sol. ex D.C. Syst.* ii. 265; *A. Cunn. Precur.* n. 626; *Raoul, Choix de Plantes*, 47. *Sisymbrium heterophyllum*, *Forst. Prodr.* n. 250; *A. Rich. Fl. Nouv. Zel.* 310.

Var. **corymbosa**, *Hook. f. l.c.*—Smaller. Leaflets in 2 pairs or reduced to a terminal one. Flowers in few-flowered corymbs.—*C. corymbosa*, *Hook. f. Fl. Antarct.* i. 6; *Hook. Ic. Plant.* t. 686.

Var. **subcarnosa**, *Hook. f. Fl. Antarct.* i. 5.—Stout and fleshy. Leaflets 3–6 pairs, obovate or oblong. Flowers numerous, large, corymbose.

Var. **uniflora**, *Hook. f. Handb. N.Z. Fl.* 12.—Small, the leaves reduced to one pinnule. Flowers on a slender 1-flowered scape, rather large, sometimes $\frac{1}{2}$ in. diam.

NORTH AND SOUTH ISLANDS, CHATHAM ISLAND, STEWART ISLAND: The variety *debilis* abundant throughout. The remaining varieties not uncommon in mountain districts in the South Island, and extending to the AUCKLAND AND CAMPBELL ISLANDS. Altitudinal range from sea-level to 6500 ft.

Widely distributed in the temperate regions of both hemispheres, and exceedingly variable wherever it is found.

2. **C. depressa**, *Hook. f. Fl. Antarct.* i. 6.—A small glabrous or pilose stemless perennial. Leaves numerous, crowded, rosulate, 1–2 in. long, elliptic or ovate-spathulate, quite entire or varying from crenate to deeply lobulate, rounded at the tip or retuse, narrowed into petioles of variable length. Flowers small, either solitary on slender scapes or in few-flowered corymbs. Pods $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, stout, erect; styles short, stout.—*Hook. f. Handb. N.Z. Fl.* 12; *Kirk, Students' Fl.* 27.

Var. **depressa**, *Hook. f. Handb. N.Z. Fl.* 12.—Larger, usually glabrous. Leaves generally lobulate.—*C. depressa*, *Hook. f. Fl. Antarct.* i. 6, t. 3 and 4B.

Var. **stellata**, *Hook. f. Handb. N.Z. Fl.* 12.—Smaller, glabrous or pilose. Leaves entire or nearly so.—*C. stellata*, *Hook. f. Fl. Antarct.* i. 7, t. 4A.

SOUTH ISLAND: Var. *depressa*: Nelson—Wairau Mountains and Lake Tennyson, *Travers, T. F. C.* Marlborough—Mount Mouatt, *Kirk!* Canterbury—Hopkins River and Lake Ohau, *Haast*. Otago—Lake District, *Hector* and *Buchanan*. AUCKLAND AND CAMPBELL ISLANDS: Both varieties abundant, ascending to nearly 2000 ft., *Sir J. D. Hooker, Kirk!*

Chiefly distinguished from reduced forms of *C. hirsuta* by the habit, spathulate leaves, and stout erect pods.

3. *C. bilobata*, *T. Kirk, Students' Fl.* 27.—Perfectly smooth and glabrous, 4–12 in. high. Rootstock rather stout. Leaves all radical, on slender petioles 1–4 in. long; blade $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, oblong or obovate, in small specimens sometimes entire, but usually pinnatifid with a very large terminal lobe and 1 or 2 pairs (rarely more) of small spreading lobes at its base. Flowering-stems 1–3, few-flowered, naked; pedicels slender, $\frac{1}{2}$ –1 in. long or more. Flowers large, white, sometimes nearly $\frac{1}{2}$ in. diam. Pods $\frac{3}{4}$ –1 in. long, narrow-linear, spreading; style long and slender.

SOUTH ISLAND: Canterbury—Broken River, *T. F. C.* Otago—Kurow Mountains, Mount Ida Range, Hector Mountains, *Petrie!* Altitudinal range 1000–3000 ft.

The fully developed state of this plant is well marked by the peculiarly lobed leaves, large flowers, and spreading pods with long slender styles. But small varieties, with the leaves entire or nearly so, show a tendency to approach *C. depressa*.

4. *C. stylosa*, *D.C. Syst. Veg.* ii. 248.—A tall rather coarse perfectly glabrous leafy branching herb 2–3 ft. high; erect or decumbent. Leaves 3–5 in. long, oblong-lanceolate or oblong-spathulate, entire or more usually minutely and remotely sinuate-toothed, sometimes lobed or pinnatifid at the base; uppermost sessile, auricled at the base; lower on long petioles. Racemes very long, 1–2 ft. Pedicels stout, short, spreading. Flowers small, white. Pods horizontally spreading, 1– $1\frac{1}{2}$ in. long, $\frac{1}{2}$ in. broad; style stout. Seeds red-brown, with a reticulate testa.—*Hook. f. Handb. N.Z. Fl.* 12; *Kirk, Students' Fl.* 27. *C. divaricata*, *Hook. f. Fl. Nov. Zel.* i. 13. *Arabis gigantea*, *Hook. Ic. Plant.* t. 259.

KERMADEC ISLANDS: Macaulay Island, not uncommon, *T. F. C.* NORTH ISLAND: In several localities from Mongonui southwards, but often rare and local. SOUTH ISLAND: Marlborough—Queen Charlotte Sound, *Banks and Solander!* Picton, *J. Rutland*; Mount Stokes, *J. Macmahon*.

Readily known by its large size and branched leafy habit, long racemes, and horizontally spreading pods and pitted seeds. It is a common Australian and Tasmanian plant.

5. *C. fastigiata*, *Hook. f. Handb. N.Z. Fl.* 13.—Rootstock long, stout, tapering, often as thick as the finger, bearing at the top a rosette of densely crowded radical leaves. Leaves $1\frac{1}{2}$ –3 in. long, linear- or lanceolate-spathulate, acute, sharply and deeply inciso-serrate, gradually narrowed into a broad flat petiole, thick and coriaceous, glabrous or with a few weak hairs on the margins. Cauline leaves similar, but smaller and less toothed. Flowering-stems usually several springing from the top of the rootstock among the radical leaves, simple or branched, 6–18 in. high. Flowers numerous, white, corymbose, about $\frac{1}{3}$ in. diam. Petals $\frac{1}{3}$ in. long, spathulate, on long claws. Pods erect or nearly so, straight or curved, acute at both ends, narrow-linear, 1–2 in. long, $\frac{1}{5}$ – $\frac{1}{2}$ in. broad. Seeds

compressed, red-brown.—*Kirk, Students' Fl.* 28. *Arabis fastigiata*, *Hook. f. Fl. Nov. Zel.* ii. 324. *Pachycladon elongata*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 216. *Notothlaspi Hookeri*, *Buch. l.c.* xx. (1888) 255, t. 13.

SOUTH ISLAND: Nelson—Wairau Gorge, *Sinclair! T. F. C.* Marlborough—Macrae's Run, *Monro*; Upper Awatere, *Kirk!* Canterbury—River-bed of the Macaulay, *Haast*. Otago—Mountains near Lakes Wanaka and Ohau, *Buchanan!* Altitudinal range 2500–5000 ft.

This and the two following species differ from *Cardamine* in the seeds being 2-seriate.

6. *C. latesiliqua*, *Cheesem. in Trans. N.Z. Inst.* xv. (1883) 298. —Rootstock stout, spongy, as thick as the finger, often branched at the top, each division furnished with a rosette of densely crowded radical leaves. Flowering-stems few or many, erect or spreading, branched, leafy at the base, 6–24 in. high. Radical leaves 3–6 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, narrow linear-spathulate to obovate-spathulate, gradually narrowed to the base, coarsely serrate above, thick and coriaceous, more or less villous, especially on the margins. Upper cauline leaves smaller, lanceolate, nearly entire. Flowers rather large, white, very numerous. Petals nearly $\frac{1}{2}$ in. long, spathulate, on long claws. Pods erect or suberect, usually curved, somewhat turgid, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad. Seeds numerous, compressed, reddish-brown.—*Kirk, Students' Fl.* 28.

SOUTH ISLAND: Nelson—Mount Arthur, *T. F. C.*, *Bryant! Gibbs!* Mount Owen and the Raglan Mountains, *T. F. C.* Altitudinal range 3000–5500 ft. December–January.

A handsome plant, with much of the habit and general appearance of *C. fastigiata*, but easily distinguished by the villous leaves, larger flowers, and much broader pods, which have a turgid appearance very unusual in the genus.

7. *C. Enysii*, *Cheesem. MSS.* — Short, stout, 2–4 in. high. Rootstock thick and fleshy, perpendicular, $\frac{1}{2}$ in. diam., bearing at its summit numerous radical leaves, and a short flowering-stem which is much branched from the base, and forms a rounded or pyramidal head 2–5 in. diam. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, oblong-spathulate, obtuse or subacute, narrowed into a broad flat petiole, rather thin, sharply serrate, sometimes almost pinnatifid, more or less densely clothed on both surfaces with stellate pubescence. Cauline leaves linear or linear-spathulate, toothed towards the tip. Flowers numerous, corymbose, white. Pedicels slender, spreading, $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Petals spathulate, with long claws. Pods (immature) narrow-linear, flat, about 1 in. long. Seeds numerous, in 2 series.—*Kirk, Students' Fl.* 28.

SOUTH ISLAND: Canterbury—Mountains at the head of the Broken River, alt. 6500 ft., *J. D. Enys* and *T. F. C.*; Craigieburn Mountains, alt. 6000 ft., *Cockayne!* Otago—Mount Ida, 5000 ft., *Petrie!*

A very remarkable plant, easily separated from the two preceding species by the smaller size, depressed habit, and stellate pubescence. The seeds are too immature in all my specimens to allow me to determine the position of the radicle, and it is possible that the plant may not belong to *Cardamine*.

3. **SISYMBRIUM**, Linn.

Annual or more rarely perennial erect herbs, either glabrous or more or less tomentose or hairy. Flowers small, white or yellow, usually in rather lax racemes. Sepals short or long, equal or the lateral saccate. Petals with long claws. Style short; stigma 2-lobed. Pod long, slender, terete or slightly compressed; valves convex; septum membranous. Seeds usually numerous, not margined, in a single row in each cell; cotyledons incumbent.

A genus of about 80 species, widely spread in Europe and from thence to eastern Asia, and with a few representatives in most temperate countries. The single New Zealand species is endemic.

1. **S. novæ-zealandiæ**, Hook. f. *Handb. N.Z. Fl.* 11.—An erect slender sparingly branched herb 6–18 in. high, usually hoary with minute stellate pubescence, rarely almost glabrous. Leaves chiefly radical, very variable in size and shape, $\frac{1}{2}$ –2 in. long; petiole long or short; blade $\frac{1}{4}$ –1 in., obovate to narrow-oblong, quite entire or sinuate-toothed or pinnatifid; lobes usually blunt. Cauline leaves few, smaller. Flowers small, white. Fruiting racemes rather lax; pedicels slender, $\frac{1}{3}$ – $\frac{3}{4}$ in. long. Pods 1–2 in. long, $\frac{1}{15}$ – $\frac{1}{10}$ in. broad, narrow-linear, obtuse, spreading, glabrous; valves slightly convex, midrib distinct; style very short. Seeds numerous, small; cotyledons incumbent.—*Kirk, Students' Fl.* 30.

SOUTH ISLAND: Nelson—Wairau Gorge, *Travers, Rough*. Canterbury—Broken River, Coleridge Pass, Porter's Pass, *Kirk! Enys!* Mackenzie Plains and Lake Tekapo, *T. F. C.* Otago—Not uncommon in the eastern and central portions of the district, *Petrie!* Altitudinal range from sea-level to 3000 ft. December–January.

4. **PACHYCLADON**, Hook. f.

A short stout depressed alpine herb, clothed with stellate pubescence. Rootstock long, thick and fleshy. Leaves small, rosulate. Flowers small, white. Sepals equal. Petals with long claws. Stamens free, toothless. Pod laterally compressed, linear-oblong; valves boat-shaped, keeled, not winged; nerves obscure; septum imperfect. Seeds 3–5 in each cell, obovoid; funicles short. Cotyledons incumbent.

The genus consists of a single species, confined to the southern portion of the colony. Sir J. D. Hooker remarks that in technical characters it is intermediate between the tribes *Sisymbriæ* and *Lepidineæ*, but is probably referable to the latter.

1. **P. novæ-zealandiæ**, Hook. f. *Handb. N.Z. Fl.* 724.—Root very long, fusiform, stout and fleshy, as thick as the finger, in old specimens branched above, crowned with a dense rosette of imbricating radical leaves. Leaves $\frac{1}{4}$ –1 in. long; blade oblong, pinnatifidly lobed, gradually narrowed into a short flat petiole, clothed with stellate pubescence. Cauline leaves few, smaller, digitately lobed. Peduncles numerous, springing from below the leaves and

slightly longer than them, 2-5-flowered. Petals obovate-spathulate, almost twice as long as the sepals. Pods on short stout pedicels, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, laterally compressed; valves keeled, not winged. Seeds 3-5 in each cell, obovoid, red-brown.— *Ic. Plant. t. 1009; Buch. in Trans. N.Z. Inst. xiv. (1882) t. 24, f. 1; Kirk, Students' Fl. 32. Braya novæ-zealandiæ, Hook. f. Handb. N.Z. Fl. 13.*

SOUTH ISLAND: Otago—Mount Alta, *Hector* and *Buchanan*! Mount St. Bathans, Mount Pisa, Mount Kyeburn, Mount Cardrona, &c., *Petrie*! 4500-6500 ft.

A very singular plant. Mr. Buchanan's *P. glabra* (Trans. N.Z. Inst. xiv. t. 24, f. 2) is a form with rather larger and almost glabrous leaves, with sharply pointed ascending lobes. It passes insensibly into the ordinary state.

3. **CAPSELLA**, Medicus.

Annual or rarely perennial branched herbs, of small size and weak habit, glabrous or pilose. Radical leaves entire or pinnatifid. Flowers small, white, racemed. Sepals spreading, equal at the base. Petals short. Pods oblong, ovoid, or obcordate, laterally compressed; valves convex or boat-shaped; septum thin; style short. Seeds numerous, in 2 rows. Cotyledons incumbent.

A small genus, scattered over the temperate regions of both hemispheres.

1. **C. procumbens**, *Fries Novit. Fl. Suec. Mant. i. 14.*—Slender, perfectly glabrous. Stems numerous from the root, 2-6 in. long, decumbent at the base, ascending at the tips. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in. long; lower ovate, oblong, or spathulate, entire or lobed or irregularly pinnatifid, petioled; upper smaller, more sessile, often entire. Flowers white, very small. Racemes elongating in fruit; pedicels filiform, spreading. Pod ovoid, $\frac{1}{6}$ – $\frac{1}{5}$ in. long; valves boat-shaped. Seeds 10-15 in each cell. *Benth. Fl. Austral. i. 81. C. elliptica, C. A. Mey. in Ledeb. Fl. Alt. iii. 199; Kirk, Students' Fl. 33.*

SOUTH ISLAND: Otago—On cliffs exposed to sea-spray: Oamaru; Wai-kouaiti; near Dunedin; *Petrie*! September-October.

A widely distributed plant, found in Europe, western and central Asia, north-west and South America, and Australia.

C. bursa-pastoris, Mönch, the common "Shepherd's Purse," is now established as a weed in most parts of the colony. It is an erect annual, with spreading pinnatifid radical leaves and triangular cuneate or obcordate pods, arranged in a long lax raceme.

6. **LEPIDIDIUM**, Linn.

Erect or spreading, glabrous or pubescent, annual or perennial herbs, sometimes almost shrubby. Leaves entire or divided. Flowers small, white, ebracteate. Sepals short, equal at the base. Petals short, equal, sometimes wanting. Stamens often reduced to 4 or 2. Pods variable, oblong, ovate, obcordate, or orbicular, much

compressed laterally, notched at the summit or entire, winged or not; septum narrow, membranous. Seeds one in each cell, suspended from the top of the septum; cotyledons incumbent.

A large genus of nearly 100 species, found in most temperate or warm climates. The New Zealand species are highly variable, and several are very difficult of discrimination. All are endemic.

A. Leaves undivided; serrate, crenate, or quite entire; never pinnate or pinnatifid.

- | | |
|---|--------------------------|
| Stout, erect or diffuse, 12-24 in. high. Leaves sharply serrate. Pods entire, not winged | 1. <i>L. oleraceum</i> . |
| Slender, flexuous, suberect, 12-18 in. Leaves spathulate, serrate above. Pods winged and notched above .. | 2. <i>L. Banksii</i> . |
| Slender, decumbent, 9-12 in. Leaves long-petioled, crenate. Pods ovate, winged and notched above .. | 3. <i>L. obtusatum</i> . |
| Stems prostrate, filiform, 2-5 in. Leaves linear-spathulate, $\frac{1}{3}$ -1 in., entire. Pods ovate-orbicular, notched .. | 4. <i>L. Kirkii</i> . |

B. Lower leaves pinnate or pinnatifid.

* Flowers hermaphrodite.

- | | |
|--|---------------------------|
| Procumbent, glabrous. Leaves pinnatifid, segments toothed at the tips. Racemes short, lateral. Pods ovate | 5. <i>L. flexicaule</i> . |
| Procumbent or suberect, hairy. Leaves pinnate, segments finely serrate on the upper edge. Racemes long, terminal. Pods minute, orbicular | 6. <i>L. tenuicaule</i> . |

** Flowers dicæcious.

- | | |
|---|------------------------------|
| Almost glabrous. Erect, leafy, 6-12 in. high, paniculately branched above. Pods ovate | 7. <i>L. Kawarau</i> . |
| Hoary and scabrid. Erect, strict, 2-5 in. high. Leaves almost all radical, coriaceous. Racemes short, dense. Pods ovate | 8. <i>L. Matau</i> . |
| Hairy. Suberect, 2-5 in. high. Root very long and stout. Leaves all radical. Racemes lax, open. Pods ovate-rhomboid | 9. <i>L. sisymbrioides</i> . |

1. *L. oleraceum*, *Forst. Prodr.* n. 248.—Stout or slender, erect or diffuse, perfectly glabrous, 10-24 in. high. Stem branched, leafy above, often naked and woody below, scarred. Leaves 1-4 in. long, obovate- or oblong-spathulate to narrow-spathulate, narrowed into a short flat petiole, sharply serrate or incised; upper smaller and narrower, more entire, toothed at the tip only. Flowers numerous, in terminal simple or branched racemes, in large specimens often corymbosely arranged at the ends of the branches. Stamens 4. Pods ovate or ovate-oblong, subacute, wingless, entire at the tip, $\frac{1}{8}$ in. long; pedicels slender, spreading.—*Forst. Pl. Esc.* 30; *A. Cunn. Precur.* n. 628; *Raoul, Choix de Plantes*, 47; *Hook. f. Fl. Nov. Zel.* i. 15; *Handb. N.Z. Fl.* 14; *Kirk, Students' Fl.* 34.

Var. **frondosum**, *Kirk, l.c.*—Stout, fleshy, much branched. Leaves large, 2-5 in., broadly oblong or cuneate-oblong, serrate.

Var. **acutidentatum**, *Kirk, l.c.*—Branches slender, leafy. Leaves 1-2 in., oblong- or linear-spathulate, acutely toothed towards the tip.

NORTH ISLAND: Var. *frondosum*: Banks and Solander; Three Kings Island, Little Barrier Island, Cuvier Island, T. F. C. Var. *acutidentatum*: Shaded and rocky places near the sea; once plentiful, but now fast becoming scarce. SOUTH ISLAND: Queen Charlotte Sound, Banks and Solander! Nelson Harbour, Kirk! Banks Peninsula, Armstrong; Oamaru, Port Chalmers, Catlin's River, Petrie! STEWART ISLAND: Kirk. AUCKLAND ISLANDS: Bolton, Kirk! CHATHAM ISLANDS: H. H. Travers, Cox! Nat. November–March.

Best known as “Cook’s scurvy-grass.” The entire plant has a heavy disagreeable smell and hot biting taste. It was originally discovered by Banks and Solander during Cook’s first voyage, and at that time must have been abundant, for Dr. Solander speaks of it as “*copiose in littoribus marinis*,” and Cook states that boat-loads of it were collected and used as an antiscorbutic by his crew. It is now quite extinct in several of the localities he visited, and is fast becoming rare in others. Its disappearance is due to cattle and sheep, which greedily eat it down in any locality they can reach. The figure in the unpublished Banksian plates represents var. *frondosum*; but the specimens in the set of Banks and Solander’s plants presented to the colony by the Trustees of the British Museum all belong to var. *acutidentatum*.

2. **L. Banksii**, T. Kirk, *Students’ Fl.* 35.—Perfectly glabrous. Stems slender, flexuous, branched, suberect, 12–18 in. long. Leaves 1–2 in., distant, oblong- or linear-spathulate, sharply serrate or toothed above, below gradually narrowed into a short petiole or almost sessile. Racemes terminal. Flowers small. Stamens 4. Pods ovate, cordate at the base, slightly winged, broadly notched above; style equal to or slightly exceeding the notch.—L. *oleraceum*, A. Rich. *Fl. Nouv. Zel.* 310, t. 35 (*non* Forst.).

SOUTH ISLAND: Queen Charlotte Sound and Astrolabe Harbour, A. Richard; Pelorus Sound, J. Rutland! Kenepuru, J. Macmahon.

Mr. Kirk appears to have founded this species on A. Richard’s plate, quoted above, and on a single specimen collected by Mr. Rutland in Pelorus Sound. Judging from this scanty material, there appears to be little to separate it from *L. oleraceum* var. *acutidentatum*, except the slightly winged pod notched at the summit. But some of Mr. Petrie’s Otago specimens of *L. oleraceum* show a minute notch, as also do those collected by Mr. Cox on the Chatham Islands. I much fear that the species is of doubtful validity.

3. **L. obtusatum**, T. Kirk in *Trans. N.Z. Inst.* xxiv. (1892) 423.—Stems leafy, branched, prostrate or suberect, 6–12 in. long. Lower leaves on broad flat petioles, sometimes 2 in. long; blade 1–2 in., oblong or oblong-spathulate, gradually narrowed into the petiole, obtuse, coarsely crenate or serrate. Cauline leaves sessile or nearly so, obovate or oblong-spathulate. Racemes numerous, terminating small leafy branches. Flowers small, white. Stamens 4. Fruiting pedicels slender, $\frac{1}{5}$ in. long. Pods broadly ovate, slightly winged above, with a broad shallow notch; style short, stout, about equalling the notch.—Kirk, *Students’ Fl.* 35.

NORTH ISLAND: Auckland—Sea-cliffs to the north of the Manukau Harbour, rare, T. F. C. Wellington—Maritime rocks at the entrance to Port Nicholson, Miss Kirk! October–February.

This is allied to *L. oleraceum*, but can be readily distinguished by the slender often prostrate habit, the long petioles of the radical leaves, their crenate margins, and by the notched pods. My specimens from the north of the Manukau Harbour are suberect; Mr. Kirk's are mostly prostrate.

4. **L. Kirkii**, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 439.—Small, prostrate, glabrous or nearly so. Stems many from the top of a short stout rootstock, prostrate, branched, flexuous, almost filiform, 2–4 in. long. Radical leaves entire, narrow-linear or linear-spathulate, $\frac{1}{3}$ –1 in. long, sheathing at the base, obtuse at the tip; cauline similar but smaller. Racemes short, elongating in fruit. Flowers minute. Sepals ovate, concave. Petals narrow, slightly shorter than the sepals. Stamens 4. Pods on slender pedicels about their own length, ovate-orbicular, minutely notched at the tip; style short, exceeding the notch.—*Kirk, Students' Fl.* 37.

SOUTH ISLAND: Otago—Saline situations in the Maniototo Plains, *Petrie!* December–January.

An exceedingly well marked little plant, not closely allied to any other.

5. **L. flexicaule**, *T. Kirk in Trans. N.Z. Inst.* xiv. (1882) 380.—Perfectly glabrous, smooth and fleshy. Stems numerous, branched, flexuous, procumbent; branches ascending at the tips. Lower leaves 2–3 in. long, petiolate, linear-oblong, pinnatifid; lobes 2–6 pairs, entire or toothed at the tips. Cauline leaves smaller, sessile or shortly petiolate, linear-spathulate or cuneate, coarsely toothed towards the apex. Racemes 1–2 in. long, lateral or terminal, leaf-opposed. Flowers small. Petals linear, obtuse. Stamens 2. Fruiting pedicels rather longer than the pod. Pod broadly ovate, slightly winged above, notched at the apex; style not exceeding the notch.—*Kirk, Students' Fl.* 35. *L. incisum*, *Hook. f. Fl. Nov. Zel.* i. 15; *Handb. N.Z. Fl.* 14 (*not of Roth*).

NORTH ISLAND: Auckland—Mercury Bay, *Banks and Solander!* shores of the Manukau and Waitemata Harbours, *Kirk! T. F. C.*; Rangitoto Island, *T. F. C.* SOUTH ISLAND: Near Westport, *W. Townson!* November–January.

This appears to be an exceedingly local plant, and is fast becoming extinct in the few habitats at present known. It is well characterized by the procumbent habit, lateral racemes, and diandrous flowers.

6. **L. tenuicaule**, *T. Kirk in Trans. N.Z. Inst.* xiv. (1882) 381.—More or less clothed with minute soft whitish hairs, rarely glabrous. Stems numerous, slender, branched, procumbent or suberect, 6–12 in. long. Radical leaves numerous, thin, 1–4 in. long, linear-oblong, pinnate or pinnatifid; leaflets sometimes stalked, finely and sharply serrate or lacinate on the upper edge; teeth irregular, sometimes piliferous; petiole sheathing at the base. Cauline leaves usually few, sometimes absent, oblong-spathulate to linear, sessile or shortly petiolate, entire or serrate. Flowers very numerous, minute, in long and slender terminal racemes. Petals wanting. Stamens 4. Pod very small, orbicular, shorter than the

slender pedicel, winged above, minutely notched; style scarcely longer than the notch.—*Kirk, Students' Fl.* 37. *L. australe*, *Kirk in Trans. N.Z. Inst.* xiv. (1882) 381.

SOUTH ISLAND: Otago—Usually near the sea; Oamaru, Hampden, Awamoko, Weston, Orepuki, *Petrie!* STEWART ISLAND: Dog Island; Ruapuke, *Kirk!* November–January.

A distinct but highly variable species, easily recognised by the minute orbicular pods. Mr. Kirk's *L. australe* is a state with the stems more erect than usual, and with more numerous cauline leaves.

7. **L. Kawarau**, *Petrie in Trans. N.Z. Inst.* xvii. (1885) 270.—Dioecious, erect or diffuse, glabrous or slightly hairy, 6–12 in. high or more. Stems leafy, much branched above. Radical leaves numerous, 3–5 in. long, linear-oblong, pinnatifid or pinnate with a broad rachis; leaflets rather distant, linear, entire or with 1–3 linear lobes on the upper edge, rarely on the lower as well; petioles sheathing at the base. Cauline leaves many, lower like the radical but sessile, gradually passing into the uppermost, which are narrow-linear, entire. Racemes very numerous at the ends of the branches, forming a much-branched panicle. Flowers small. Petals apparently wanting in both sexes. Stamens 4–6. Fruiting pedicels spreading or ascending, rather longer than the pods. Pods ovate or ovate-oblong, notched at the apex; style slightly exceeding the notch.—*Kirk, Students' Fl.* 36.

Var. **dubium**, *Kirk, l.c.*—Taller, much more hairy, almost scabrid; branches few, long, lax. Cauline leaves shorter and broader, pinnatifid. Petals present in the male flowers.

SOUTH ISLAND: Otago—Kawarau River, Cromwell, *Petrie!* Var. *dubium*: Near Duntroun, *Petrie!* November–December.

Allied to *L. Matau*, with which it entirely agrees in the flowers and pods. It differs in the greater size, branched leafy habit and almost glabrous leaves, which are much larger and have long and narrow toothed pinnæ. The var. *dubium* has a distinct appearance, but barely seems entitled to specific rank.

8. **L. Matau**, *Petrie in Trans. N.Z. Inst.* xix. (1887) 323.—Dioecious, erect, hoary with short scabrid hairs, 2–5 in. high. Root stout, woody. Stems one or several from the root, stout, somewhat strict, branched above. Radical leaves numerous, coriaceous, scabrid, 1–2 in. long, linear or linear-oblong, deeply pinnatifid or almost pinnate; segments rounded or oblong, rarely linear, entire or lobed on the upper edge. Cauline leaves oblong or ovate, sessile, usually entire. Flowers small, in short and dense racemes at the ends of the branches. Petals wanting in both sexes. Stamens 4. Fruiting pedicels patent or slightly decurved, rather longer than the pods. Pods ovate, not winged, shortly notched above; style short, slightly exceeding the notch.—*Kirk, Students' Fl.* 36.

SOUTH ISLAND: Otago—Alexandra South, Gimmerburn, *Petrie*! November–December.

Best recognised by the strict habit, scabrid and coriaceous leaves, short dense racemes, and apetalous diœcious flowers.

9. *L. sisymbrioides*, *Hook. f. Handb. N.Z. Fl.* 14.—Diœcious, pubescent or almost glabrous, suberect, 2–5 in. high. Root stout and woody, often as thick as the finger, very long and tapering, much divided at the top. Leaves nearly all radical, numerous, crowded, spreading, 1–2 in. long, linear or linear-oblong in outline, deeply pinnatifid; segments many, small, short, entire or lobulate on the upper edge; petioles flat, often dilated at the base. Flowering-stems numerous, slender, branched, spreading or suberect, usually with a few small entire cauline leaves below, sometimes naked. Flowers small, in terminal racemes; males with 4 narrow petals or apetalous; females always apetalous. Stamens 4. Pods about half as long as the slender spreading pedicels, ovate-rhomboid, acute at both ends, slightly winged above, minutely notched; style exceeding the notch.—*Kirk, Students' Fl.* 37. *L. Solandri*, *Kirk in Trans. N.Z. Inst.* xiv. (1882) 380.

SOUTH ISLAND: Canterbury—Broken River district, *Haast, Enys*! *Kirk*! *T. F. C.*; Mackenzie Plains, *J. F. Armstrong*; Lakes Tekapo and Pukaki, *T. F. C.*; Lake Ohau, *Haast*. Otago—Waitaki Valley, Lake Wanaka, *Buchanan*! Kurow, *Petrie*! Altitudinal range 800–3000 ft. December–January.

A distinct species, at once separated from the two preceding by the more depressed habit, lax racemes, and ovate-rhomboid pods. The stout cylindrical root often descends for distances altogether out of proportion to the short stems. Mr. Enys on one occasion showed me specimens nearly 4 ft. in length.

7. *NOTOTHLASPI*, *Hook. f.*

Small fleshy simple or branched alpine herbs, glabrous or slightly hairy. Leaves all radical, or radical and cauline, spathulate, petiolate. Flowers rather large, white, densely crowded in a terminal raceme, or corymbose at the tips of the branches. Sepals erect, equal at the base. Petals spathulate. Pods rather large, obovate or oblong, much compressed, valves very broadly winged. Seeds numerous in each cell, reniform, attached by slender long funicles. Cctyledons incumbent; radicle often very long.

The genus is confined to the mountains of the South Island of New Zealand. Stem simple. Flowers densely crowded on a stout terminal peduncle or scape. Style very short 1. *N. rosulatum*. Stem usually much branched. Flowers corymbose at the ends of the branches. Style long 2. *N. australe*.

1. *N. rosulatum*, *Hook. f. Handb. N.Z. Fl.* 15.—A very remarkable stout erect leafy pyramidal fleshy herb 3–9 in. high; stem very short or almost wanting. Leaves all radical, very numerous, most densely crowded, fleshy, imbricated, forming a rosette

or cushion, spathulate, crenate or dentate, when young clothed with white cellular ribband-like hairs, glabrous or nearly so when old, narrowed into a petiole of variable length. Scape very stout, sometimes as thick as the finger, covered with densely crowded sweet-scented flowers, forming a conical or pyramidal raceme. Pods $\frac{1}{2}$ –1 in. long, obovate, very broadly winged, notched at the top; style very short; stigma 2-lobed. Seeds numerous, subreniform, pitted; radicle very long, twice folded, first upwards then downwards and backwards over the back of the cotyledons.—*Kirk, Students' Fl.* 38. *N. notabile*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 344, t. 25.

SOUTH ISLAND: Nelson and Canterbury—Not uncommon on dry shingle-slopes on the mountains, but easily overlooked. Otago—Mount Ida, *P. Goyen*. Altitudinal range 2000–5000 ft. December–February.

One of the most singular plants in the colony. When in flower or fruit it has a conical or pyramidal shape; but flowerless specimens form rosettes or cushions of closely packed imbricating leaves, from which no doubt has arisen the local name of “penwiper plant.” The flowers are deliciously fragrant.

2. *N. australe*, *Hook. f. Handb. N.Z. Fl.* 15.—Small, densely tufted, usually much branched from the base; branches leafy, spreading, 1–4 in. long. Leaves radical and cauline, numerous, $\frac{1}{2}$ –1½ in. long, petiolate, linear- or oblong-spathulate, entire or crenate, glabrous or with a few cellular hairs, often recurved. Flowers very numerous, corymbose, about $\frac{1}{4}$ in. diam. Pod much smaller than in the preceding species, $\frac{1}{3}$ –½ in. long, broadly oblong or elliptic, winged, barely notched at the top; style long, almost $\frac{3}{4}$ the length of the pod. Seeds numerous, pitted; radicle long, slender.—*Kirk, Students' Fl.* 38. *Thlaspi* (?) *australe*, *Hook. f. Fl. Nov. Zel.* ii. 325.

Var. *stellatum*, *Kirk, l.c.* 39. — Stems not branched. Leaves narrow linear-spathulate; petioles pubescent. Flowers numerous, on long 1-flowered peduncles.

SOUTH ISLAND: Nelson—An abundant plant on the mountains, from 2500 to 5000 ft. Var. *stellatum*: Mount Rintoul, *F. G. Gibbs, W. H. Bryant*.

A pretty little plant, originally discovered by Sir David Monro. Although very common in the Nelson District, it has not been observed further south than Lake Tennyson.

ORDER IV. VIOLARIÆ.

Herbs, shrubs, or small trees. Leaves usually alternate, simple, entire lobed or cut, stipulate. Flowers regular or irregular, axillary, solitary or arranged in cymes or panicles, rarely racemose. Sepals 5, equal or unequal, imbricate. Petals 5, hypogynous, equal or unequal, lower one sometimes spurred, usually imbricate. Stamens 5, hypogynous; filaments short, broad; anthers erect, free or connate round the pistil; connective broad, usually produced beyond the cells into an appendage. Ovary free, 1-celled, with

3-5 parietal placentas; ovules many or few to each placenta. Fruit either a 3-5-valved capsule or a berry. Seeds usually small; embryo straight, in the axis of fleshy albumen.

An order scattered over the whole world, containing 22 genera and about 250 species. The roots of many of the species are emetic, and are used as a substitute for ipecacuanha. One of the New Zealand genera is found in most countries; the other two have a very limited distribution outside the colony.

Herbs. Flowers irregular, the lower petal produced into a spur. Fruit a capsule	..	..	..	1. VIOLA.
Trees or shrubs. Flowers regular. Fruit a berry.				
Anthers free	..	..	..	2. MELICYTUS.
Anthers coherent	..	..	..	3. HYMENANTHERA.

1. VIOLA, Linn.

Annual or perennial herbs of small size. Leaves tufted at the top of a short woody rootstock or alternate on creeping or trailing stems, stipulate. Flowers irregular, on radical or axillary 1-flowered peduncles. Sepals 5, slightly produced at the base. Petals 5, spreading, the lowest usually longer and spurred at the base. Anthers 5, nearly sessile, the connectives flat, produced into a thin membrane beyond the cells, the two lower often spurred at the base. Style swollen above, straight or oblique at the tip. Capsule 3-valved; valves elastic, each with a single parietal placenta. Seeds ovoid or globose.

A large genus, widely diffused in all temperate climates, the species probably numbering considerably over 100. Two of the New Zealand species are endemic, the third extends to Tasmania.

In most of the species of the genus the flowers are dimorphic; some, which are usually produced early in the flowering season, having conspicuous flowers with large petals, as a rule ripening few seeds; others, which appear in late summer or autumn, being much smaller, with either minute petals or none at all, but which ripen abundance of seed. These are usually called cleistogamic flowers.

Stems slender, elongated. Leaves cordate. Stipules and bracts lacerate	..	..	..	1. <i>V. filicaulis</i> .
Stems slender. Leaves cordate. Stipules and bracts entire	..	..	..	2. <i>V. Lyallii</i> .
Stems short. Leaves ovate. Stipules and bracts entire	..	..	..	3. <i>V. Cunninghamii</i> .

1. *V. filicaulis*, Hook. f. *Fl. Nov. Zel.* i. 16.—Slender, perfectly glabrous. Stems numerous, almost filiform, prostrate, sometimes ascending at the tips. Leaves alternate, ovate-cordate orbicular-cordate or almost reniform, $\frac{1}{4}$ – $\frac{2}{3}$ in. diam., obtuse or subacute, obtusely crenate; petioles slender. Stipules broad, deeply lacinate; teeth filiform, often glandular-tipped. Peduncles slender, 2-4 in. long; bracts about the middle, linear, toothed or lacerate. Flowers $\frac{1}{2}$ in. diam. Sepals linear-lanceolate. Petals spatulate; spur short.—*Handb. N.Z. Fl.* 16; *Kirk, Students' Fl.* 40.

Var. **hydrocotyloides**, *Kirk, Students' Fl.* 41.—Much smaller, sparingly pilose. Leaves $\frac{1}{2}$ – $\frac{1}{4}$ in. diam. Peduncles short.—*V. hydrocotyloides*, *Armstr. in Trans. N.Z. Inst.* xiv. (1882) 360.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from Whangarei southwards. Var. *hydrocotyloides*: Otago, *Petrie!* Stewart Island, *Stack!* *Petrie!* *Kirk!* Altitudinal range from sea-level to 4000 ft. November–February.

The long creeping stems, small leaves, and fimbriate bracts and stipules distinguish this from the two following. It produces numerous reduced or cleistogamic flowers late in summer and autumn.

2. **V. Lyallii**, *Hook. f. Handb. N.Z. Fl.* 16.—Perfectly glabrous. Stems slender, shorter than in *V. filicaulis*, ascending at the tips. Leaves $\frac{1}{3}$ –1 in. diam., broadly ovate or rounded, deeply cordate at the base, obtuse or subacute, obscurely crenate or nearly entire; petioles variable in length, 2–6 in. Stipules linear, entire. Peduncles very slender, variable in length, 3–7 in. Bracts usually above the middle, linear, entire. Flowers $\frac{1}{2}$ in. diam., white streaked with lilac and yellow.—*Kirk, Students' Fl.* 41. *V. Cunninghamii* var. *gracilis*, *Hook. f. Fl. Nov. Zel.* i. 16. *Erpetion spathulatum*, *A. Cunn. Prodr.* n. 622 (*non G. Don.*).

NORTH AND SOUTH ISLANDS: Not uncommon from Kaitaia and Hokianga southwards; ascending to 4000 ft. on the Mount Arthur Plateau, Nelson. October–January.

Usually a larger plant than the preceding, with the stem not so decidedly creeping, larger leaves and longer petioles, and with the stipules and bracts entire, not lacerate. The cordate leaves separate it from *V. Cunninghamii*.

3. **V. Cunninghamii**, *Hook. f. Fl. Nov. Zel.* i. 16.—Glabrous except the petioles, which are occasionally pubescent. Rootstock often somewhat woody, creeping below, often branched above. Leaves tufted at the top of the rootstock, or on short branches springing from it, $\frac{1}{2}$ –1 in. diam., triangular-ovate or ovate-oblong, truncate at the base or narrowed into the petiole, obtuse or subacute, obscurely crenate; petioles short or long. Stipules adnate at the base to the petiole, usually entire, acute. Peduncles slender, exceeding the leaves; bracts linear, acute. Flowers $\frac{1}{3}$ – $\frac{2}{3}$ in. diam., white, usually streaked with lilac and yellow. Sepals linear-oblong. Lateral petals bearded.—*Handb. N.Z. Fl.* 16; *Kirk, Students' Fl.* 41. *V. perexigua*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 326.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Rotorua and the East Cape southwards; abundant in many places, especially in the mountains. CHATHAM ISLANDS: *Buchanan* (*Trans. N.Z. Inst.* vii. 334). Altitudinal range from sea-level to 5000 ft. October–January. Also found in Tasmania.

The short stems and tufted leaves, which are usually either truncate at the base or narrowed into the petioles, are the best distinguishing characters of this plant. It varies greatly in size; lowland specimens, growing among scrub, &c., sometimes have the petioles 8–9 in. long, and the peduncles of corresponding size, while alpine specimens are frequently much depauperated. The flowers of the latter, however, are usually larger than those of the lowland forms.

2. **MELICYTUS**, Forst.

Trees or shrubs. Leaves petiolate, alternate, toothed or serrate; stipules minute. Flowers small, regular, diœcious, in little fascicles on the branches or axillary. Sepals 5, united at the base. Petals 5, short, spreading. Anthers 5, free, sessile; connective produced above into a broad membrane furnished with a scale at the back. Ovary 1-celled, with 3-5 parietal placentas. Style 3-6-fid at the apex, or stigma nearly sessile, lobed. Fruit a berry, with few or several angled seeds.

A small genus, limited to the four New Zealand species, one of which is also found in Norfolk Island and the Tongan Islands.

Leaves oblong or oblong-lanceolate, serrate	1. <i>M. ramiflorus</i> .
Leaves large, obovate, coriaceous, sinuate-serrate	2. <i>M. macrophyllus</i> .
Leaves long, linear-lanceolate, sharply and finely serrate ..	3. <i>M. lanceolatus</i> .
Leaves small, orbicular-ovate, sinuate-toothed	4. <i>M. micranthus</i> .

1. ***M. ramiflorus***, Forst. *Char. Gen.* 124, t. 62.—A glabrous tree or large shrub 20-30 ft. high, with a trunk 1-2 ft. in diam.; bark white; branches brittle. Leaves alternate, 2-5 in. long, oblong-lanceolate, usually with a short acuminate point but sometimes obtuse, bluntly and sometimes obscurely serrate, veins reticulate; petioles short, slender; stipules deciduous. Flowers small, $\frac{1}{8}$ in. diam., greenish, diœcious, in axillary fascicles or on the branches below the leaves; pedicels slender, $\frac{1}{3}$ in. long, with 2 minute bracts. Calyx-teeth 5, minute. Petals obtuse, spreading. Male flowers with 5 obtuse sessile anthers, each with a concave scale at the back. Females with a short conical ovary, crowned with a 4-6-lobed stigma. Berry small, violet-blue, $\frac{1}{8}$ in. diam.; seeds few, black, angled.—*A. Rich. Fl. Nouv. Zel.* 313; *A. Cunn. Precur.* n. 623; *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 18; *Handb. N.Z. Fl.* 17; *Kirk, Forest Fl.* t. 3; *Students' Fl.* 42.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, ascending to fully 3000 ft. *Mahoe*. November-January. Also found in Norfolk Island and the Tongan Islands.

The leaves and young branches are greedily eaten by cattle; the wood is white and soft, but has been employed for producing a special kind of charcoal used in making gunpowder.

2. ***M. macrophyllus***, *A. Cunn. Precur.* n. 624.—A tall slender sparingly branched shrub 8-15 ft. high; bark brownish. Leaves 3-7 in. long, obovate or oblong, coarsely sinuate-serrate, acute or shortly acuminate, coriaceous; petioles short. Flowers twice as large as those of *M. ramiflorus*, $\frac{1}{4}$ in. diam., greenish, in 4-10-flowered fascicles; pedicels stout, decurved, $\frac{1}{2}$ in. long, with 2 rounded bracts just below the flower. Male flowers: Calyx-lobes broad, obtuse. Petals more than twice as long as the calyx, spreading, strap-shaped, recurved at the tips. Anthers sessile, apiculate. Females: Calyx of the males. Petals shorter, more erect, barely half as long

again as the calyx. Style short, stout; stigma broad, discoid, 3-5-lobed. Berry globose, $\frac{1}{4}$ in. diam.; seeds 4-6.—*Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 18; *Handb. N.Z. Fl.* 17; *Kirk, Students' Fl.* 42.

NORTH ISLAND: Not uncommon in hilly forests from Kaitaia southwards to the Waikato River. SOUTH ISLAND: Waikari Creek, near Dunedin, *G. M. Thomson! Petrie!* Sea-level to 2000 ft. September-October.

Easily distinguished from *M. ramiflorus* by the larger, more coriaceous, obovate leaves, and larger flowers on decurved pedicels, with the bracts placed just below the flowers. The Otago specimens have smaller leaves, but are not otherwise different.

3. *M. lanceolatus*, *Hook. f. Fl. Nov. Zel.* i. 18, t. 8.—A slender glabrous shrub 6-15 ft. high, with brownish bark; branches succulent, brittle. Leaves 3-6 in. long, lanceolate or linear-lanceolate, acuminate, finely and sharply serrate, membranous; petioles short. Flowers small, in 2-5-flowered fascicles; pedicels short, slender, decurved, with 2 bracts above the middle. Calyx-lobes oblong, obtuse or subacute. Petals erect, recurved at the tip. Connective of the anthers produced into a long subulate point. Style long; stigmas 3, minute. Berry globose, $\frac{1}{4}$ in. diam., blue-black when fully ripe; seeds 6-12, angled, minutely tubercled.—*Handb. N.Z. Fl.* 17; *Kirk, Students' Fl.* 43.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in forests south of Whangarei. Ascends to 3000 ft. on Te Aroha Mountain. October-November.

This can be recognised by the narrow leaves, subulate appendage to the anthers, long 3-fid style, and minutely tuberculate seeds. The anthers often cohere at the back, as in *Hymenanthera*, but in habit and other respects the species agrees better with *Melicytus*.

4. *M. micranthus*, *Hook. f. Fl. Nov. Zel.* i. 18.—A shrub or small tree 5-15 ft. in height, very variable in habit, sometimes a much-branched bush with tortuous and interlaced rigid branches, at other times a small tree with a compact head and slender trunk 2-5 in. diam.; branchlets pubescent at the tips. Leaves alternate or fascicled on short lateral branchlets, coriaceous, small, $\frac{1}{5}$ -1 in. long, oblong-obovate or obovate or orbicular-obovate, obtuse, sinuate or toothed, rarely lobed; petioles short, puberulous. Flowers minute, axillary, solitary or 2-3 together; pedicels longer or shorter than the petioles, pubescent. Male flowers: Calyx-lobes short, rounded, often ciliate. Petals twice as long as the calyx, broadly oblong, obtuse. Anthers sessile, very broad, rounded, obtuse, connective flat. Females: Calyx and petals of the males. Abortive anthers present. Ovary ovoid; style short, thick; stigma large, discoid, with 3-5 fleshy lobes. Berry oval or subglobose, $\frac{1}{8}$ - $\frac{1}{4}$ in. diam., purple or purple-black. Seeds 1-4, smooth or angled.—*Handb. N.Z. Fl.* 17; *Kirk, Students' Fl.* 43. *Elæodendron micranthum*, *Hook. f. in Lond. Journ. Bot.* iii. 228, t. 8.

Var. **longiusculus**.—Leaves usually larger, $\frac{1}{2}$ –1 in., oblong-obovate. Flowers on longer pedicels. Fruit small, globose, $\frac{1}{8}$ – $\frac{1}{6}$ in.

Var. **microphyllus**.—Leaves smaller, $\frac{1}{8}$ – $\frac{1}{2}$ in., orbicular-obovate. Pedicels shorter. Fruit large, ovoid, $\frac{1}{8}$ – $\frac{1}{4}$ in.—*M. microphyllus*, *Col. in Trans. N.Z. Inst.* xix. (1887) 260, and xx. (1888) 189.

NORTH AND SOUTH ISLANDS: Abundant in lowland forests, by the side of streams, &c., from the Bay of Islands to Otago. November–May.

Easily distinguished from all other species of *Melicytus* by the stiff rigid habit, small leaves, and minute few-seeded berries. It is exceedingly variable; and the two varieties characterized above are certainly connected by intermediate forms. I am much indebted to Mr. Carse for a fine series of flowering and fruiting specimens of both varieties, collected near Mauku, where they appear to grow intermixed. Mr. Colenso's herbarium also contains numerous well-selected specimens.

3. **HYMENANTHERA**, R. Br.

Rigid woody shrubs. Leaves alternate or fascicled, entire or toothed; stipules minute, fugacious. Flowers small, regular, hermaphrodite or unisexual, solitary or fascicled, axillary or on the naked branches below the leaves. Sepals 5, obtuse, united at the base. Petals 5, rounded at the tip. Anthers 5, sessile, connate into a tube surrounding the pistil; connectives terminating in a toothed or fimbriate process, and furnished with an erect scale at the back. Style short; stigma 2-fid, rarely 3–4-fid. Fruit a small subglobose berry; seeds usually 2, rarely 3–4.

A small genus of about half a dozen species, found in New Zealand, Australia and Tasmania, and Norfolk Island. The New Zealand species are exceedingly difficult of discrimination. They vary greatly in the leaves and vegetative characters generally; and the flowers and fruit, so far as they are known, are very similar in all. Most of them occur in localities which are not easily reached, making it difficult to secure specimens in a proper state for comparison.

- | | |
|---|---|
| Much-branched rigid maritime shrub. Leaves small, linear-spathulate or linear-obovate, $\frac{1}{3}$ –1 in. long | 1. <i>H. crassifolia</i> . |
| Shrub, often leafless. Branches flexuous or zigzag, interlaced. Leaves linear or linear-cuneate, $\frac{1}{4}$ – $\frac{3}{4}$ in. long | 2. <i>H. dentata</i> , var. <i>angustifolia</i> . |
| Slender glabrous shrub. Leaves oblong-obovate, $\frac{3}{4}$ –2 in. long, quite entire. Flowers solitary or geminate | 3. <i>H. obovata</i> . |
| Stout spreading shrub. Leaves large, $1\frac{1}{2}$ –4 in., ovate-oblong to obovate, sinuate-toothed. Flowers numerous. Berry 2-seeded | 4. <i>H. latifolia</i> . |
| Tall erect shrub. Leaves large, 3–5 in., lanceolate or ovate-lanceolate, serrate. Flowers numerous. Berry 4-seeded | 5. <i>H. chathamica</i> . |

1. ***H. crassifolia***, *Hook. f. Fl. Nov. Zel.* i. 17, t. 7.—A low rigid much-branched shrub 2–4 ft. in height; branches tortuous, stout and woody; bark white, furrowed; branchlets pubescent. Leaves alternate or fascicled, very thick and coriaceous, $\frac{1}{3}$ – $1\frac{1}{2}$ in. long, linear-spathulate or linear-obovate, entire sinuate or toothed, rarely lobed, rounded at the apex or retuse; petioles very short. Stipules minute, fugacious. Flowers very small, solitary or few together,

axillary; peduncles shorter than the flowers, decurved, with one or two broad concave bracts below the middle. Sepals orbicular, with fimbriate margins. Petals narrow-oblong, obtuse, recurved at the apex. Anthers 5, the broad membranous connectives connate into a tube which has a fimbriate projection above each anther and a broad scale at the back. Ovary 1-celled; style 2-fid. Berry purplish, broadly oblong, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam.; seeds 2.—*Handb. N.Z. Fl.* 18; *Kirk, Students' Fl.* 44. *Scævola* (?) *novæ-zealandiæ*, *A. Cunn. Precur.* n. 429.

NORTH ISLAND: Maritime rocks opposite the Cavallos Islands, *R. Cunn.*; Cape Palliser, *Colenso*! Port Nichol-on, *Kirk*! SOUTH ISLAND: Coast between Nelson and Croixelles Harbour, *Kirk*! *T. F. C.*; Pelorus Sound, *J. Rutland*; Banks Peninsula, *Armstrong*. Otago—Hampden, Moeraki, Dunedin, Balclutha, *Petrie*! STEWART ISLAND: *Kirk*. October–November.

A variable plant. One of Mr. Colenso's Cape Palliser specimens has slender branches bearing ovate-rhomboid leaves 1 in. long, the same branch also having linear obovate leaves of the ordinary type.

2. *H. dentata*, *R. Br.*, var. *angustifolia*, *Benth. Fl. Austral.* i. 104.—A much-branched frequently leafless rigid shrub, in sheltered situations 4–8 ft. high, with flexuous or zigzag often interlaced branches; in exposed or alpine places shorter and much dwarfed, with the branches densely compacted and ending in stout thorns. Branchlets terete or grooved, covered with minute lenticels. Leaves few or many, often altogether wanting, alternate or fascicled, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear or linear-cuneate or linear-obovate, obtuse or retuse, entire or sinuate or irregularly lobed, varying from almost membranous to thick and coriaceous, narrowed into very short petioles. Flowers minute, solitary or geminate, on very short decurved peduncles, diœcious. Male flowers: Sepals rounded, with fimbriate margins. Petals twice as long as the sepals, linear-oblong, recurved at the tips. Connective of the anthers with a narrow appendage toothed or fimbriate at the tip, and an oblong scale at the back. Females: Calyx and petals of the males, but rather smaller. Abortive anthers present. Style 2-fid. Berry 2-seeded; seeds oblong, flat on the inner face, convex on the outer.—*Kirk, Students' Fl.* 44.

Var. *alpina*, *Kirk, l.c.*—Much depressed, 1–2 ft. in diam., forming a mass of densely compacted short and thick spinous branches. Leaves $\frac{1}{2}$ – $\frac{1}{3}$ in. long, oblong- or linear-obovate, very thick and coriaceous.

NORTH ISLAND: Wellington—Turangarere, *A. Hamilton*! Upper Rangitikei, *Petrie*! SOUTH ISLAND: Nelson—Wairoa Valley, *Bryant*! Wangapeka Valley, Wairau Gorge, *T. F. C.* Canterbury—*J. B. Armstrong*. Otago—Paradise, near Mount Earnslaw, *Kirk*! Catlin's River, Kelso, *Petrie*! Winton, *B. C. Aston*! Var. *alpina*: Broken River, Canterbury, *Kirk*! *Enys*! *T. F. C.* Also found in Tasmania.

In its usual state this curious plant is best distinguished from *H. crassifolia* by the more slender frequently leafless branches, which are usually thickly dotted with minute lenticels, and by the narrower leaves. The Nelson specimens, which are the only ones I have seen in flower, are certainly diœcious, but Tasmanian specimens are said to be hermaphrodite.

3. *H. obovata*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 350.—An erect glabrous shrub 4–12 ft. in height, in sheltered places slender and sparingly branched, in more exposed situations forming a compactly branched bush. Leaves of mature plants $\frac{3}{4}$ –2 in. long, obovate or oblong-obovate, thick and coriaceous, obtuse or retuse, quite entire, gradually narrowed into a short petiole; margins slightly recurved. Leaves of seedling plants membranous, obovate-cuneate, toothed or lobed. Flowers small, solitary or geminate, axillary or on the branches below the leaves, apparently dioecious, but not seen in a state fit for description. Berry ovoid, purplish, 2-seeded; seeds plano-convex.—*Students' Fl.* 44.

SOUTH ISLAND: Nelson—Between Takaka and Riwaka, *Kirk*! Graham River, Mount Arthur, Mount Owen, *T. F. C.* Marlborough—Queen Charlotte Sound, *Banks and Solander*! Canterbury—Broken River, *Kirk*! Ashburton Mountains, *T. H. Potts*! Altitudinal range from 1000 to 4000 ft. November.

A well-marked plant, at once recognised by the usually slender habit, strict branches, and entire obovate leaves. It is generally found on limestone rocks.

4. *H. latifolia*, *Endl. Prodr. Fl. Ins. Norfolk*, 70.—A stout sparingly branched shrub 3–10 ft. high; branches erect or straggling; bark covered with minute lenticels. Leaves alternate, variable in size and shape, $1\frac{1}{2}$ –4 in. long, ovate or ovate-lanceolate to obovate or obovate-oblong, coriaceous, obtuse or subacute, narrowed into a short stout petiole, sinuate or sinuate-serrate, rarely entire; margin thickened, slightly recurved; veins reticulate. Flowers dioecious, fascicled, $\frac{1}{10}$ in. diam. Males: Often very numerous and clustered on the branches for a considerable length; pedicels decurved, bracteolate about the middle. Sepals ovate, obtuse, free almost to the base. Petals twice as long as the sepals, linear-oblong, erect at the base, revolute at the tips. Anthers 5; connectives produced into a long and narrow projection above each anther which is almost as long as the anther and jagged at the tip. Females: Smaller and less numerous, on shorter pedicels, usually erect. Sepals and petals as in the males. Ovary ovoid; stigmas 2. Berry broadly ovoid or nearly globose, purplish; seeds 2, plano-convex, grooved on the convex face, with a large strophiole.—*Kirk, Students' Fl.* 45. *H. latifolia* var. *tasmanica*, *Kirk in Trans. N.Z. Inst.* iii. 163.

NORTH ISLAND: Three Kings Islands, *T. F. C.*; North Cape Peninsula, *Buchanan*! *Kirk*! *T. F. C.*; Taranga Islands, *Kirk*! *T. F. C.*; Great Barrier and adjacent islets, *Kirk*! Little Barrier Island, *Kirk, T. F. C.*, *Miss Shakespear*! Waiheke Island, rare, *Kirk*; Cuvier Island, *T. F. C.*; Shoe Island, *J. Adams*! August–September. Also in Norfolk Island.

The identification of this plant with the Norfolk Island *H. latifolia* must not be considered as proved until specimens from both localities have been compared. The large broad leaves and numerous flowers separate it from its New Zealand allies.

5. *H. chathamica*, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 514.—An erect glabrous shrub; bark furrowed, dotted with minute lenticels. Leaves alternate, 2–5 in. long, lanceolate or oblong-lanceolate, coriaceous, acute, narrowed into a short petiole, sharply toothed; margins thickened; veins reticulate on both surfaces. Flowers in crowded fascicles along the branches, dioecious; pedicels slender, longer than the flowers, decurved. Male flowers: Sepals ovate, free almost to the base. Petals more than twice as long as the sepals, revolute at the tips. Anthers with a lanceolate jagged connective more than half as long as the cells; dorsal scale cuneate-spathulate. Female flowers not seen. Berry ovoid or subglobose, white, usually 4-seeded. Seeds angled, outer surface convex; strophiole small.—*Students' Fl.* 45. *H. latifolia* var. *chathamica*, *F. Muell. Veg. Chatham Is.* 9.

NORTH ISLAND: Wellington—Patea, *Hector!* CHATHAM ISLANDS: *Capt. G. Mair!* *H. H. Travers!* *F. A. D. Cox!* *Mahoe.* September–October.

There is little to separate this from the preceding except the longer and narrower sharply toothed leaves and the 4-seeded berry, and I doubt the constancy of this latter character. Sir James Hector's Patea specimens have neither flowers nor fruit, but appear to belong to the same species.

ORDER V. PITTOSPOREÆ.

Trees or shrubs, rarely climbers. Leaves alternate or whorled, simple, seldom toothed or lobed, exstipulate. Flowers regular, hermaphrodite or more rarely unisexual, terminal or axillary. Sepals 5, free or connate at the base, imbricate. Petals 5, hypogynous, imbricate, often cohering at the base, limb spreading or recurved. Stamens 5, hypogynous, free; anthers versatile. Ovary normally 1-celled, with 2–5 parietal placentas, but often more or less completely 2–5-celled from the intrusion of the placentas; style simple; ovules usually numerous on each placenta. Fruit capsular or succulent and indehiscent. Seeds generally numerous; albumen copious; embryo minute, with the radicle next the hilum.

Genera 9; species about 120. The order is confined to Australia, with the exception of *Pittosporum* itself, which has a wide distribution in the warm regions of the Old World. Many of the species are more or less resinous and aromatic.

PITTOSPORUM, Banks.

Trees or shrubs, glabrous or tomentose. Leaves alternate or subverticillate, usually entire, rarely sinuate-toothed or lobed. Flowers axillary or terminal, solitary or in fascicles umbels or corymbs. Sepals free or connate below. Petals 5, with erect claws, often connivent below; tips recurved. Stamens 5, erect; filaments subulate; anthers 2-celled, introrse. Ovary incompletely 2–4-celled; style short. Capsule globose, ovoid or obovoid,

1-celled; valves 2-4, hard and woody, bearing the placentas along the centre. Seeds immersed in a viscid fluid.

A genus of between 60 and 70 species, found in Africa, subtropical Asia, Australia, the Pacific islands, and New Zealand. All the New Zealand species are endemic, and most of them are confined to the North Island. The flowers are frequently polygamous or even unisexual.

A. Flowers axillary and solitary, rarely fascicled, sometimes terminal, but in that case axillary flowers are always present as well.

- | | |
|--|---|
| Leaves 1-2 in., obtuse or acute, thin, margins waved. | |
| Flowers usually solitary. Capsules $\frac{1}{2}$ in. diam., valves thin | 1. <i>P. tenuifolium</i> . |
| Leaves 2-3 in., acute, coriaceous, margins flat. Flowers usually solitary. Capsule $\frac{1}{2}$ in. diam., valves thick and woody | 2. <i>P. Colensoi</i> . |
| Flowers in axillary and terminal fascicles, otherwise as in <i>P. Colensoi</i> | 2A. <i>P. Colensoi</i> , var. <i>fasciculatum</i> . |
| Leaves 2-5 in., oblong-lanceolate, submembranous. Peduncles long, $\frac{3}{4}$ in., 1-2-flowered. Capsules less than $\frac{1}{2}$ in. diam. | 3. <i>P. Buchananii</i> . |
| Leaves $1\frac{1}{2}$ -2 in., oblong-obovate. Flowers axillary and terminal, solitary or fascicled. Capsules mostly terminal, large, $\frac{3}{4}$ in. diam. | 4. <i>P. intermedium</i> . |
| Leaves large, 3-5 in., broadly oblong, usually covered with white floccose tomentum when young. Flowers axillary and terminal, solitary or fascicled. Capsules $\frac{3}{4}$ in. diam. | 5. <i>P. Huttonianum</i> . |
| Leaves small, $\frac{1}{2}$ in., obcordate. Flowers axillary, solitary or geminate | 6. <i>P. obcordatum</i> . |

B. Flowers strictly terminal, in umbels or fascicles, rarely solitary.

- | | |
|---|------------------------------|
| Small rigid shrub. Leaves small, $\frac{1}{4}$ - $\frac{1}{2}$ in., linear-obovate, entire or lobed. Flowers solitary. Capsules small, $\frac{1}{4}$ in. | 7. <i>P. rigidum</i> . |
| Leaves linear or linear-oblong, entire lobed or pinnatifid. Umbels 4-8-flowered. Capsules $\frac{1}{4}$ in., globose, 2-valved | 8. <i>P. patulum</i> . |
| Leaves linear- or elliptic-lanceolate, 1-2 in., often lobed or pinnatifid on young trees, clothed with ferruginous pubescence. Capsules $\frac{1}{2}$ in., globose, 2-valved. | 9. <i>P. virgatum</i> . |
| Leaves elliptic-oblong or elliptic-obovate, 2-4 in., clothed with ferruginous tomentum. Capsule broadly ovoid, $\frac{3}{4}$ in., 2-valved | 10. <i>P. ellipticum</i> . |
| Leaves oblong or oblong-obovate, 2-5 in., white beneath, margins flat. Capsule $\frac{3}{4}$ in., 3-valved | 11. <i>P. Ralpii</i> . |
| Leaves linear-obovate, 2-3 in., white or buff below, thick, margins recurved. Capsule tomentose, $\frac{3}{4}$ -1 $\frac{1}{2}$ in., 3-valved | 12. <i>P. crassifolium</i> . |
| Leaves elliptic-obovate, 2-3 in., glabrous when mature, margins flat. Capsule $\frac{3}{4}$ -1 in., glabrous, 3-4-valved | 13. <i>P. Fairchildii</i> . |
| Leaves obovate or lanceolate-oblong, glabrous. Umbels many-flowered. Capsules small, $\frac{1}{2}$ in. diam., tetragonous or 4-lobed, 2-valved. | 14. <i>P. umbellatum</i> . |
| Leaves linear-obovate, 2-4 in., glabrous. Flowers yellow. Capsules large, elliptic-oblong, 1 $\frac{1}{2}$ in. long, 2-valved | 15. <i>P. Kirkii</i> . |
| Usually epiphytical. Leaves whorled, elliptic-lanceolate, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ in. Capsules $\frac{1}{2}$ in. diam. | 16. <i>P. cornifolium</i> . |
| Small undershrub, 1-4 ft. Leaves linear or linear-oblong, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. Sepals and petals narrow-linear. Capsule $\frac{1}{2}$ in. diam., beaked | 17. <i>P. pimeleoides</i> . |

C. Flowers in terminal compound umbels or corymbs.

Tree with white bark. Leaves elliptic, 2-4 in. Flowers
yellow. Capsules small, $\frac{1}{4}$ in. 18. *P. eugenioides*.

1. ***P. tenuifolium***, *Banks and Sol. ex Gärtn. Fruct.* i. 286, t. 59, f. 7.—A small tree 15-30 ft. in height, with a slender trunk and dark almost black bark; young leaves and branchlets usually pubescent, becoming glabrous when mature. Leaves alternate, 1-2 $\frac{1}{2}$ in. long, oblong-ovate or elliptic-obovate, obtuse acute or shortly acuminate, quite entire, membranous or slightly coriaceous, margins undulate: petiole short. Flowers axillary, solitary or rarely fascicled, $\frac{1}{4}$ - $\frac{1}{2}$ in. long; peduncles about as long as the calyx, pubescent, straight or curved. Sepals oblong to ovate, obtuse or subacute, silky or glabrous. Petals dark-purple. Ovary silky. Capsule $\frac{1}{2}$ in. diam., 3-valved, broadly obovoid or subglobose, downy when young, glabrous and minutely rugose when old; valves rather thin.—*A. Cunn. Precur.* n. 615; *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 21; *Handb. N.Z. Fl.* 19; *Kirk, Forest Fl.* t. 46; *Students' Fl.* 47. *Trichilia monophylla*, *A. Rich. Fl. Nouv. Zel.* 306, t. 34, *bis*.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape to the Bluff. Altitudinal range from sea-level to 3000 ft. *Kohuhu*. October-November.

An abundant and variable plant, the best distinguishing characters of which are the small submembranous leaves with wavy margins, axillary and usually solitary flowers, and small capsules with rather thin valves. The leaves are often pale-green, especially on young plants.

2. ***P. Colensoi***, *Hook. f. Fl. Nov. Zel.* i. 22.—A small tree, very closely allied to the preceding, but larger and more robust, with stouter branches. Leaves 2-4 in. long, oblong-lanceolate elliptical-oblong or obovate-oblong, acute, coriaceous, margins usually flat; petiole short, stout. Flowers axillary and solitary in the typical form, rarely fascicled; peduncles short, erect or decurved, glabrous or pubescent; bracts not so caducous as in *P. tenuifolium*. Sepals broadly oblong, glabrous or pubescent. Capsule globose; valves thick and woody.—*Handb. N.Z. Fl.* 19. *P. tenuifolium*, *var. Colensoi*, *Kirk, Students' Fl.* 47.

Var. fasciculatum.—Leaves as in the typical form. Flowers in many-flowered fascicles, both terminal and in the axils of the uppermost leaves. Sepals lanceolate, acute, and with the peduncles densely covered with soft tomentum.—*P. fasciculatum*, *Hook. f. Fl. Nov. Zel.* i. 24; *Handb. N.Z. Fl.* 20. *P. tenuifolium*, *var. fasciculatum*, *Kirk, Students' Fl.* 47.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Rotorua and the Patetere Plateau southwards, but often local. Ascends to 3000 ft. October-November.

Very closely allied to *P. tenuifolium*, and connected with it by numerous intermediates. Mr. Kirk unites the two, and there is much to be said in favour of such a course. But it must be admitted that *P. Colensoi*, with its

stouter branches, much larger sharply pointed and more coriaceous deeper-green flat leaves, has a very distinct aspect from *P. tenuifolium*; so that, notwithstanding the intermediates, I am inclined to regard the differences between the usual states of the two plants as being too pronounced for varietal distinction alone.

3. **P. Buchananii**, *Hook. f. Handb. N.Z. Fl.* 725.—A shrub or small tree 10 to 20 ft. high, with slender spreading or ascending branches; young shoots and leaves silky-pubescent. Leaves alternate, 2–5 in. long, oblong or oblong-lanceolate or elliptic-oblong, rather membranous, acute or acuminate; margins flat, not waved; petioles slender. Peduncles axillary, solitary, slender, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, 1-flowered or rarely 2-flowered, glabrous or silky-pubescent. Sepals ovate-oblong, obtuse. Petals linear, dark-purple; claw long. Ovary silky. Capsule less than $\frac{1}{2}$ in. diam., subglobose, 3-valved, on long spreading peduncles.—*Kirk, Students' Fl.* 47.

NORTH ISLAND: Auckland—Kaitaia and Mongonui, *Buchanan*! Taranaki—Near Mount Egmont, *Hector*! Wellington—In several localities, *Kirk*!

This appears to be a rare and local species closely allied to *P. tenuifolium*, and chiefly separated from it by the longer and narrower leaves, long peduncles, narrower flowers, and smaller spreading capsules.

4. **P. intermedium**, *T. Kirk in Trans. N.Z. Inst.* iv. (1872) 266.—A small tree, in habit and foliage much resembling large specimens of *P. tenuifolium*; bark black; young shoots and leaves pubescent. Leaves $1\frac{1}{2}$ –2 in. long, obovate or elliptic-obovate, obtuse or subacute, submembranous or slightly coriaceous, narrowed into rather long petioles; margins flat, not waved. Flowers both terminal and in the axils of the upper leaves, solitary or in 2–3-flowered clusters; peduncles short, pubescent. Sepals oblong, obtuse or subacute, silky. Capsules usually terminal, large, nearly $\frac{3}{4}$ in. diam., broadly ovoid or obovoid, downy, 2–3-valved; peduncles stout, decurved.—*Students' Fl.* 48.

NORTH ISLAND: Auckland—Kawau Island, *Kirk*! October–November.

A puzzling plant, in habit and foliage not to be distinguished from large forms of *P. tenuifolium*, but the flowers are chiefly terminal and often fasciated, and the capsule is much larger, exactly matching that of *P. ellipticum*. Only one tree has been seen, and that was cut down several years ago. *P. ellipticum* is not known on Kawau Island or in the neighbourhood, or I should have felt tempted to have considered it as a hybrid between that species and *P. tenuifolium*.

5. **P. Huttonianum**, *T. Kirk in Trans. N.Z. Inst.* ii. (1870) 92.—A sparingly branched shrub or small tree 10–25 ft. high; bark black; young leaves and branches covered with white floccose tomentum, becoming glabrous when mature. Leaves alternate, 3–5 in. long, broadly oblong elliptical-oblong or obovate-oblong, obtuse or acute, coriaceous, flat; petioles $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Flowers either axillary and solitary or in 2–5-flowered axillary and terminal cymes; peduncles slender, covered with loose white tomentum. Sepals

oblong or lanceolate, acute, tomentose. Petals ligulate, sharply recurved. Ovary silky. Capsules larger than in *P. tenuifolium*, $\frac{2}{3}$ in. diam., globose or broadly obovoid, 3-valved, rarely 2-valved, downy or nearly glabrous.—*Students' Fl.* 48.

Var. **viridifolium**, *Kirk, l.c.*—Branchlets more numerous, slender. Leaves thinner, oblong-obovate, acute, tapering into the petiole, perfectly glabrous. Flowers axillary, solitary. Approaches *P. Colensoi*, and has equal claims to be considered a large-leaved form of that species.

NORTH ISLAND: Auckland—Great and Little Barrier Islands, *Kirk!* Cape Colville Peninsula, from Cabbage Bay to Ohinemuri, *Kirk! T. F. C.* Var. *viridifolium*: Rotorua, *Kirk!* Taranaki—Urenui, *T. F. C.*; near Mount Egmont, *Tryon!* SOUTH ISLAND: Milford Sound, *Kirk!* October–November.

Varies much in the number and position of the flowers, which may be either solitary and axillary, or collected into few-flowered cymes, which are then mostly terminal, constituting Mr. Kirk's var. *fasciatum*. The typical form appears to be restricted to the Auckland District. I leave the var. *viridifolium* as Mr. Kirk placed it, but probably it would be more appropriately included in *P. Colensoi*.

6. **P. obcordatum**, *Raoul, Choix des Plantes*, 24, t. 24. — A shrub or small tree 8–15 ft. high; bark pale; branches numerous, spreading, often tortuous, the younger ones silky towards the tips. Leaves alternate or in alternate fascicles of 2–4, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, broadly obovate or obcordate, gradually narrowed into a short slender petiole, coriaceous, entire, glabrous or the margins under-surface and petioles more or less silky-pubescent, veins conspicuous beneath. Flowers small, $\frac{1}{8}$ in. long, axillary, solitary or 2–3 together, pale-purple or almost white; peduncles short, slender, silky. Sepals very short, ovate-lanceolate, silky with white hairs. Petals linear, with spreading tips. Ovary silky. Capsule ovoid, acuminate, glabrous when old, about $\frac{1}{4}$ in. long, 2-valved.—*Hook. f. Fl. Nov. Zel.* i. 22; *Handb. N.Z. Fl.* 20; *Kirk, Students' Fl.* 48.

NORTH ISLAND: Auckland—Outlet of Lake Tongonge, near Kaitaia, *R. H. Matthews!* SOUTH ISLAND: Canterbury—Shady woods near Akaroa, *Raoul.* September–October.

Mr. Matthews's specimens, from which the above description is drawn up, appear to differ from the type in the young leaves and branchlets being silky-pubescent. In all other respects they match Raoul's plate very closely.

7. **P. rigidum**, *Hook. f. Fl. Nov. Zel.* i. 22, t. 10.—A rigid much and closely branched shrub 4–12 ft. high; branches stout and woody, spreading, usually tortuous and interlaced, rarely slender and erect; young shoots usually pubescent. Leaves small, alternate or fascicled on short lateral branchlets, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-obovate to oblong or elliptical, very thick and coriaceous or almost membranous, entire or sinuate-toothed or even deeply and irregularly lobed, glabrous or nearly so; margins recurved; petioles short, stout. Flowers small, solitary, either obviously terminal on the branches or seated at the tip of short arrested branchlets and thus appearing axillary, sessile or on very short peduncles. Sepals.

short, narrow-ovate, caducous. Ovary hirsute. Capsule small, broadly ovoid, apiculate, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, 2-valved, pilose when young, almost glabrous when old.—*Handb. N.Z. Fl.* 20; *Kirk, Students' Fl.* 49.

NORTH ISLAND: Mount Hikurangi, *Adams! Petrie!* Lake Waikaremoana and Ruahine Mountains, *Colenso!* Tararua Mountains, *H. H. Travers! T. P. Arnold!* SOUTH ISLAND: Nelson—Maitai Valley and Dun Mountain Range, *Rev. F. H. Spencer! T. F. C.!*; Wangapeka and Buller Valley, *T. F. C.!*; Lake Guyon, *W. T. L. Travers!* Marlborough—Mount Stokes, *Macmahon!* Canterbury—Lake Grasmere, *Kirk!* Waimakariri Valley, *Cockayne!* Otago—Dusky Bay, *Hector* and *Buchanan.* Altitudinal range from sea-level to 4000 ft. November–December.

The flowers are described as axillary in the Handbook, but in all the flowering specimens I have seen they either terminate the main branches or are placed at the tip of short lateral ones, as shown in the beautiful plate given in the "*Flora Novæ-Zelandiæ.*" But the lateral branchlets are sometimes very short, giving the flowers the appearance of being axillary.

8. *P. patulum*, *Hook. f. Handb. N.Z. Fl.* 19.—An erect shrub or small tree 6–15 ft. high, glabrous except the young shoots and peduncles, which are sparingly clothed with fulvous silky hairs; branchlets stout. Leaves extremely variable, in the young state 1–2 in. long, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad, linear, closely and deeply lobed or pinnatifid, the lobes often again toothed, gradually passing into the mature stage, which is linear or linear-oblong, entire or crenate-serrate, coriaceous, obtuse, gradually narrowed into a short stout petiole. Flowers in 4–8-flowered terminal umbels; pedicels slender, $\frac{1}{2}$ in. long. Sepals ovate-lanceolate, pointed. Petals twice as long as the sepals, obtuse, recurved at the tips. Capsules globose or broader than long, $\frac{1}{3}$ in. diam., compressed, 2-valved.—*Kirk, Students' Fl.* 50.

SOUTH ISLAND: Nelson—Lake Rotoiti, *Buchanan! T. F. C.!* Wairau Mountains, *Sinclair!* Lake Guyon, *Travers!* Glacier Gully, *Spenser Mountains, Kirk!*

A very remarkable and distinct species, of which more specimens are required to frame a good description. I have only one flowering specimen.

9. *P. virgatum*, *T. Kirk in Trans. N.Z. Inst.* iv. (1872) 264.—A small tree 15–25 ft. in height, with slender trunk and black bark; branchlets, young leaves, petioles, and inflorescence densely clothed with ferruginous tomentum. Leaves very variable, in young trees $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, linear-lanceolate or elliptic-lanceolate, entire lobed or pinnatifid, gradually passing into the mature forms, which are 1–2 in. long, elliptic- or oblong-obovate to oblong-ovate or oblong-lanceolate, usually entire but occasionally sinuate or lobed, obtuse or acute, gradually narrowed into rather short petioles. Flowers terminal, either solitary or in 2–4-flowered umbels. Sepals linear-lanceolate, acuminate, densely tomentose. Petals shortly recurved at the tips. Capsules erect, globose, $\frac{1}{2}$ in. diam., 2-valved, glabrous when fully mature.—*Students' Fl.* 50.

NORTH ISLAND: Coast south of Mongonui, *T. F. C.* Whangaroa, *Buchanan!* Kirk! Great Barrier Island, *Kirk!* Kennedy's Bay, *T. F. C.*; hills near Tairua, *Petrie!* September–October.

The ferruginous pubescence, small terminal umbels, narrow sepals, and small globose capsule are the best characters of this species, which is nearest to *P. ellipticum*. The extreme variability of the leaves in the young plants is noteworthy. The mature stage, which is usually entire, is seldom attained until the tree has flowered for some years.

10. *P. ellipticum*, *T. Kirk* in *Trans. N.Z. Inst.* iv. (1872) 266.—A small spreading tree with black bark, 15–25 ft. high; branchlets, young leaves, and inflorescence densely covered with ferruginous tomentum. Leaves 2–4 in. long, elliptic-oblong or elliptic-obovate to oblong-lanceolate, acute or obtuse, quite entire, coriaceous; petioles short, stout. Flowers in terminal 2–5-flowered umbels; peduncles short, decurved. Sepals ovate-lanceolate, acute, densely tomentose. Petals recurved at the tips. Capsules broadly ovoid, slightly compressed, $\frac{2}{3}$ in. diam., tomentose, 2-valved; valves faintly 2-lobed.—*Kirk, Students' Fl.* 52.

Var. *ovatum*, *Kirk, l.c.*—Leaves smaller, spreading, broadly elliptical or obovate, rounded at the apex. Flowers not seen.

NORTH ISLAND: Whangaroa, *Buchanan!* Kirk! Mount Manaia, Whangarei Heads, *Kirk!* *T. F. C.*; coast north of the Manukau Harbour, Waitakerei West, *T. F. C.* Var. *ovatum*: Whangaroa and Mount Manaia, *Kirk!* October.

Allied to *P. virgatum*, but distinguished by the much larger and broader entire leaves, which do not differ in the young state, and by the larger flowers and capsules.

11. *P. Ralphii*, *T. Kirk* in *Trans. N.Z. Inst.* iii. (1871) 161.—A laxly branched shrub 8–15 ft. in height, with dark-brown bark; branchlets, undersurface of leaves, petioles, and inflorescence densely clothed with thick white or buff tomentum. Leaves spreading, 2–5 in. long, oblong or oblong-obovate, quite entire, obtuse or acute, coriaceous, white with appressed tomentum beneath; margins flat; petioles slender, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Flowers in terminal 3–10-flowered umbels; peduncles as long as the petioles. Sepals narrow-ovate, acuminate, tomentose. Petals spreading or recurved at the tips. Capsules on rather slender peduncles, broadly ovoid, $\frac{2}{3}$ in. long, pubescent, 3-valved.—*Students' Fl.* 51.

NORTH ISLAND: East Cape district, not uncommon, *Banks and Solander!* *Colenso!* *H. Hill!* *Adams and Petrie!* &c.; Hawke's Bay, *A. Hamilton!* Upper Wanganui River, *H. C. Field!* Patea, *Dr. Ralph!* October–November.

Closely allied to *P. crassifolium*, but the leaves are much larger, oblong, not gradually narrowed into the petiole, and the margins are flat, not recurved, while the capsules are much smaller. It is without doubt the *P. crassifolium* of Banks and Solander's MSS., as is proved by their drawing and specimens; but unfortunately the name was applied by Putterlich and Cunningham to the following plant.

12. **P. crassifolium**, *A. Cunn. Precur.* n. 612.—A shrub or small tree 15–30 ft. high; branches erect, fastigate; bark dark-brown; branchlets, leaves below, petioles, and inflorescence densely clothed with white or buff appressed tomentum. Leaves 2–3 in. long, oblong-obovate or linear-obovate, gradually narrowed into a short stout petiole, obtuse, quite entire, very coriaceous, dark-green and shining above, clothed with white or buff tomentum beneath; margins recurved. Flowers unisexual, in terminal umbels; males 5–10-flowered; females 1–5-flowered; peduncles $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, drooping. Sepals oblong-lanceolate, tomentose. Petals twice as long as the sepals, revolute at the tips. Fruiting peduncle stout, decurved. Capsules large, $\frac{3}{4}$ – $1\frac{1}{4}$ in. long, subglobose, tomentose, 3- rarely 4-valved; valves very thick and woody.—*Putterlich, Syn. Pittosp.* 12; *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 23; *Handb. N.Z. Fl.* 20; *Bot. Mag.* t. 5978; *Kirk, Forest Fl.* t. 14; *Students' Fl.* 51.

Var. **strictum**, *Kirk, Trans. N.Z. Inst.* iv. 266.—Fruiting peduncles strict, erect. Capsules smaller.

KERMADEC ISLANDS: Northern shore of Sunday Island, *T. F. C.* NORTH ISLAND: Abundant on the coast, from the North Cape to Poverty Bay. Var. *strictum*: Little Barrier Island, *Kirk*! East Cape, *Bishop Williams*. *Karo*. September–October.

A well-known plant, readily distinguished by the strict habit, narrow-obovate coriaceous tomentose leaves, and large capsules. The flowers are usually dark-purple; but Mr. A. Osborne has sent me specimens of a yellow-flowered variety collected at Tryphena Harbour, Great Barrier Island.

13. **P. Fairchildii**, *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 147.—A compact round-topped shrub 8–15 ft. high; branches slender, spreading; bark brown; branchlets leaves and peduncles clothed with white silky hairs when young, glabrous when mature. Leaves often crowded, spreading, 2–3 in. long, obovate or elliptic-obovate or elliptic-oblong, obtuse or acute, gradually narrowed into short stout petioles, coriaceous, margins flat. Flowers terminal, solitary or in 2–4-flowered umbels. Sepals linear-oblong, acute, tomentose. Petals more than twice as long as the sepals, recurved at the tips. Fruiting peduncles slender, decurved. Capsules large, depressed, broader than long, $\frac{3}{4}$ –1 in. diam., glabrous even when half-grown, 3–4-valved; valves hard and woody, often lobed.—*Kirk, Students' Fl.* 51.

NORTH ISLAND: Three Kings Islands, *T. F. C.* August–September.

Differs from *P. crassifolium* in the broader flat leaves and smaller glabrous depressed capsule. It approaches *P. umbellatum* in the foliage, but is readily distinguished by the silky tomentose branchlets, fewer flowers, and much larger capsules.

14. **P. umbellatum**, *Banks and Sol. ex Gært. Fruct.* i. 286, t. 59.—A small branching tree 12–25 ft. high, perfectly glabrous except the young shoots, which are thinly clothed with silky

fulvous hairs. Leaves alternate or subwhorled, 2-4 in. long, obovate-oblong or elliptic-oblong or lanceolate-oblong, obtuse or acute, coriaceous, dark-green above, paler below, narrowed into rather long petioles $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Flowers in many-flowered terminal umbels; peduncles slender, longer than the petioles. Sepals ovate-lanceolate. Petals ligulate, obtuse, slightly recurved. Ovary pubescent. Fruiting peduncles slender, decurved. Capsules $\frac{1}{2}$ in. diam., rounded, tetragonous or 4-lobed, 2-valved; valves woody, granulate.—*A. Cunn. Precur.* n. 613; *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 24; *Handb. N.Z. Fl.* 21; *Kirk, Students' Fl.* 50.

Var. **cordatum**, *Kirk in Trans. N.Z. Inst.* iv. 264. — Leaves narrower, linear-obovate or obovate-spathulate, acute, gradually narrowed into the petiole. Capsules rounded, cordate, acuminate; valves not lobed.

NORTH ISLAND: Not uncommon along the shores from the North Cape to Poverty Bay. Var. *cordatum*: Haratoanga, Great Barrier Island, *Kirk!* September–November.

Easily recognised by the many-flowered umbels and roundish 4-lobed capsules.

15. **P. Kirkii**, *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* ii. (1869) 92. — A stout sparingly branched glabrous shrub 4-12 ft. high, often epiphytic; branches stout; bark reddish-purple. Leaves crowded or whorled, 2-5 in. long, linear-obovate, obtuse or subacute, very thick and coriaceous, quite entire, gradually narrowed into a short stout petiole; margins thickened, slightly recurved. Flowers yellow, in terminal 3-10-flowered umbels. Sepals lanceolate, acuminate. Petals more than twice as long as the sepals, very narrow linear, acuminate, sharply recurved. Fruiting peduncles short, stout, erect. Capsules large, $1\frac{1}{2}$ in. long, elliptic-oblong or elliptic-obovoid, 2-valved, quite glabrous, cuspidate.—*Kirk, Students' Fl.* 50.

NORTH ISLAND: Auckland—Between Whangape and Hokianga, *Kirk!* Maungataniwha, *T. F. C.*; Bay of Islands, *A. Cunningham*; plateau near Taheke, *Petrie!* Maungatapere, *H. Carse!* Whangarei, *Buchanan*; Great Barrier Island and Omaha, *Kirk!* Cape Colville Peninsula, from Cabbage Bay to Te Aroha, *Kirk, T. F. C.*; Waitakerei and Titirangi Ranges, *T. F. C.* Taranaki—Mount Egmont Ranges, *J. Adams* and *T. F. C.* Altitudinal range from 800 to 3000 ft. December–January.

A handsome and well-marked species, which cannot be confounded with any other.

16. **P. cornifolium**, *A. Cunn. Bot. Mag.* t. 3161. — A slender sparingly branched shrub 2-5 ft. high, usually growing as an epiphyte on the trunks or branches of forest trees, more rarely on rocks, never truly terrestrial. Branches forked or whorled, glabrous, or the younger ones silky-pubescent. Leaves whorled, $1\frac{1}{2}$ - $2\frac{1}{2}$ in. long, elliptic-lanceolate or elliptic-obovate, acute, coriaceous, quite entire, glabrous; petioles very short. Flowers polygamous or diœcious, in 3-5-flowered terminal umbels; females

smaller and on shorter peduncles. Sepals linear-subulate. Petals much longer, subulate-lanceolate, broad at the base and then narrowed into long acuminate points. Capsules erect or inclined, $\frac{1}{2}$ in. diam., broadly ovoid or obovoid, 3-valved; valves orange-yellow inside. — *Precur.* n. 616; *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 23; *Handb. N.Z. Fl.* 21; *Kirk, Students' Fl.* 49.

NORTH ISLAND: From the North Cape to Wellington; abundant in the north, often local to the south of Hawke's Bay. SOUTH ISLAND: Pelorus Sound and Titi Island, *J. Rutland*! Sea-level to 2800 ft. June–September.

This is a common plant in the forests of the Auckland District, growing intermixed with other epiphytes on the trunks and branches of the rata (*Metrosideros robusta*) and other large forest trees.

17. *P. pimeleoides*, *R. Cunn. ex A. Cunn. Precur.* n. 618. — A small slender much-branched shrub 1–5 ft. in height; branchlets usually numerous, almost filiform, pilose when young. Leaves numerous, crowded or whorled, very variable in size and shape, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{10}$ – $\frac{1}{3}$ in. broad, linear-lanceolate to linear-oblong, acute or acuminate, rarely obtuse, entire or rarely obscurely crenulate, patent or reflexed, somewhat membranous. Flowers small, yellow-red, in terminal 2–8-flowered umbels or solitary, unisexual; males larger, more numerous, and on longer peduncles than the females; peduncles slender, silky-pilose. Sepals subulate, acuminate. Petals more than twice as long as the sepals, very narrow, linear-acuminate. Ovary silky. Capsules on short erect peduncles, ovoid, acuminate, almost beaked, 2-valved. — *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 24; *Handb. N.Z. Fl.* 21; *Kirk, Students' Fl.* 49. *P. crenulatum*, *Putterlich, Syn. Pittosp.* 15.

Var. **major**.—Branches few, slender. Leaves in distant whorls, elliptical or elliptical-obovate, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, $\frac{1}{2}$ in. broad. Capsule rather larger.

Var. **reflexum**, *Hook. f. Fl. Nov. Zel.* i. 24. — Leaves smaller, crowded, linear or linear-lanceolate, acuminate, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad.—*P. reflexum*, *R. Cunn. l.c.* n. 617; *Hook. f. Handb. N.Z. Fl.* 19. *P. radicans*, *R. Cunn. l.c.* n. 619. *P. Gilliesianum*, *Kirk in Trans. N.Z. Inst.* i. (1868) 143.

NORTH ISLAND: North Cape (var. *major*), *T. F. C.*; near Mongonui, *Kirk*! *T. F. C.*, *R. H. Matthews*! Whangaroa, *R. Cunningham*; Kawakawa River, Bay of Islands, *R. Cunningham*, *Sir J. D. Hooker*, *Kirk*! March–May.

Easily recognised by its small size and slender habit, narrow leaves, terminal umbels of yellow-red flowers, and small-beaked capsules. The var. *reflexum* was restored as a distinct species in the Handbook, but is certainly not entitled to more than varietal rank. Both at Mongonui and Kawakawa it grows intermixed with the typical *pimeleoides*, together with numerous intermediate forms.

18. *P. eugenioides*, *A. Cunn. Precur.* n. 614.—A small branching round-headed tree 20–40 ft. high, perfectly glabrous except a few silky hairs on the branches of the inflorescence; trunk 1–2 ft. diam.; bark pale. Leaves alternate or almost whorled, 2–4 in.

long, elliptical or elliptical-oblong, acute or subacute, slightly coriaceous, narrowed into slender petioles $\frac{1}{2}$ –1 in. long; margins often undulate. Flowers polygamous or dioecious, small, yellowish, in terminal branched many-flowered compound umbels or corymbs; peduncles and pedicels slender, spreading, silky-pubescent. Sepals ovate-lanceolate, acuminate, glabrous. Petals linear-oblong, spreading and recurved, more than twice as long as the sepals. Capsules numerous, small, $\frac{1}{4}$ in. long, ovoid, acute, glabrous, 2–3-valved.—*Hook. f. Fl. Nov. Zel.* i. 22; *Handb. N.Z. Fl.* 21; *Kirk, Forest Fl.* t. 49; *Students' Fl.* 52. *P. elegans*, *Raoul, Choix de Plantes*, 25. *P. microcarpum*, *Putterlich, Syn. Pittosp.* 15.

NORTH AND SOUTH ISLANDS: Common from the North Cape to the south of Otago. *Tarata*. September–October.

The largest of the New Zealand species, and the only one with a compound inflorescence. The flowers are highly fragrant, and were formerly mixed by the Maoris with fat and used for anointing their bodies.

ORDER VI. CARYOPHYLLÆ.

Herbs, very rarely woody at the base; branches usually swollen at the nodes. Leaves opposite, quite entire or minutely serrulate, often united at the base; stipules scarious or wanting. Flowers regular, hermaphrodite. Sepals 4–5, free or cohering into a tubular calyx, imbricate. Petals 4–5 or occasionally absent, hypogynous or rarely perigynous, entire or lobed. Stamens 8–10, rarely fewer, inserted with the petals. Ovary free, 1-celled or imperfectly 3–5-celled at the base; styles 2–5, free or more or less connate into a single style; ovules 2 to many, attached to a free central or basal placenta. Fruit usually capsular, splitting into as many or twice as many valves as styles, very rarely indehiscent. Seeds few or many; albumen farinaceous, usually more or less surrounded by the narrow curved embryo.

A large and very natural order, found in every part of the world, but most abundant in temperate regions, particularly of the Northern Hemisphere; rare in the tropics, unless on high mountains. Genera about 38; species 1000 or more. The order contains some handsome garden plants, as the various kinds of carnations and pinks, but as a whole the species are insignificant, possessing no important properties or uses. Of the 4 genera indigenous in New Zealand, *Colobanthus* is confined to the south temperate zone; the remaining 3 occur in both hemispheres. More than 20 naturalised species have become well established, all of them of northern origin.

Sepals united into a tubular calyx (Silenææ).

Calyx broadly 5-nerved. Styles 2. Capsule deeply 4-valved 1. GYPSOPHILA.

Sepals free (Alsineæ).

Petals 2-fid. Styles 3–5. Capsule globular or ovoid, opening with as many valves as styles. No stipules .. 2. STELLARIA.

Petals wanting. Styles 4–5. Stamens equal in number to the sepals. No stipules 3. COLOBANTHUS.

Petals entire. Styles 3. Capsule 3-valved. Stipules scarious 4. SPERGULARIA.

1. **GYPSOPHILA**, Linn.

Annual or perennial herbs, often glaucous, sometimes glandular-pubescent or hispid. Flowers usually small, paniculate or solitary in the forks of the stem. Calyx campanulate or turbinate, 5-toothed or 5-lobed, with 5 broad green nerves separated by membranous interspaces. Petals 5, with a narrow claw; limb entire or notched. Stamens 10. Ovary 1-celled; styles 2; ovules many. Capsule globose or ovoid, 4-valved to or below the middle. Seeds subreniform, laterally attached, embryo curved round the albumen.

A genus of about 50 species, with the exception of the following one all limited to the Mediterranean region and extratropical Asia.

1. **G. tubulosa**, Boiss. *Diagn. Fl. Or.* i. 11.—A dichotomously branched erect or spreading annual 2–6 in. high, glandular-pubescent in all its parts, often viscid; stems and branches slender, terete. Leaves linear-subulate, $\frac{1}{8}$ – $\frac{1}{2}$ in., rarely longer. Flowers solitary in the forks of the branches, sometimes appearing axillary from one branch only being developed; peduncles slender, $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Calyx tubular, with 5 short teeth. Petals red or whitish-red, linear-oblong, slightly exceeding the calyx. Capsule ovoid-oblong, longer than the calyx, 5-valved at the apex. Seeds black, transversely rugose and pitted.—*Hook. f. Fl. Nov. Zel.* ii. 325; *Handb. N.Z. Fl.* 22; *Benth. Fl. Austral.* i. 155; *Kirk, Students' Fl.* 54.

NORTH ISLAND: East Coast, from Ahuriri to Cape Palliser, *Colenso*! SOUTH ISLAND: Nelson—Tarndale, *Travers*. Marlborough, *Buchanan*. Canterbury—Lake Forsyth, Lake Lyndon, *Kirk*! Rangitata Valley, *Sinclair* and *Haast*; Mackenzie Plains and Lake Tekapo, *T. F. C.*; Lake Ohau, *Haast*. Otago—Common in the interior, *Hector* and *Buchanan*, *Petrie*! Altitudinal range from sea-level to 3000 ft. November–January.

Also widely diffused in Australia, but found elsewhere only in South Europe and Asia Minor, from whence it was originally described. Several botanists have suggested that it has been introduced both into Australia and New Zealand, but so far as the latter country is concerned no evidence has ever been obtained in support of such a view.

2. **STELLARIA**, Linn.

Annual or perennial herbs of very various habit, usually low-growing and diffuse, glabrous or pubescent. Flowers white, solitary or cymose, terminal or lateral. Sepals 5, rarely 4. Petals the same number, 2-cleft, rarely wanting. Stamens 10 or fewer by abortion, hypogynous. Ovary 1-celled; styles 3, or rarely 2, 4, or 5; ovules few or many. Capsule globose to oblong, few or many-seeded, dehiscent to below the middle into twice as many valves as styles. Seeds granulate, tuberculate, or pitted.

A genus of about 75 species, dispersed over the whole world, but most abundant in cold and temperate regions. The 6 indigenous species are all endemic, but 3 others from the Northern Hemisphere have become naturalised. One of these, *S. media*, Linn., the common chickweed, is now so well established and has penetrated into such remote localities (it has been gathered in Mac-

quarie Island) that a beginner will be certain to consider it indigenous. It has flaccid procumbent much-branched stems 6 in. to 2 ft. long, marked by an alternate pubescent line; ovate acuminate leaves, the lower on long ciliate petioles; and flowers both axillary and in terminal cymes.

- | | |
|--|----------------------------|
| Creeping and matted. Leaves orbicular. Sepals subulate-lanceolate, acute | 1. <i>S. parviflora</i> . |
| Creeping and matted. Leaves orbicular, ovate, obovate, or lanceolate. Sepals oblong-ovate, obtuse | 2. <i>S. decipiens</i> . |
| Small. Leaves soft, ovate. Sepals oblong, obtuse | 3. <i>S. minuta</i> . |
| Creeping or suberect. Leaves linear-oblong. Flowers almost sessile. Sepals ovate-lanceolate, acuminate | 4. <i>S. elatinoides</i> . |
| Glaucous, erect, dichotomously branched. Leaves linear. Flowers large, green, $\frac{3}{4}$ in. | 5. <i>S. Roughii</i> . |
| Tufted, suberect, rigid and wiry. Leaves acerose, linear-subulate | 6. <i>S. gracilentia</i> . |

1. ***S. parviflora***, *Banks and Sol. ex Hook f. Fl. Nov. Zel. i. 25*.—A slender pale-green flaccid herb with creeping stems rooting at the nodes, often much branched and forming broad matted patches 6–12 in. diam. or more, glabrous or with a few weak hairs on the petioles. Leaves membranous, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, orbicular or broadly ovate, acute or mucronate, rarely cordate at the base; blade usually longer than the petiole. Peduncles solitary, axillary, usually much longer than the leaves, 1–3-flowered; a pair of bracteoles at the fork of the peduncle, and another pair on one and sometimes on all the pedicels. Flowers minute, $\frac{1}{12}$ in. diam. Sepals subulate-lanceolate or oblong-lanceolate, acute, with white scarious margins. Petals wanting or 5, 2-cleft to nearly the base, shorter than the sepals. Styles 3. Capsule longer than the sepals, deeply 6-valved. Seeds 4–12, red-brown, deeply pitted.—*Hook. f. Handb. N.Z. Fl. 23*; *Kirk, Students' Fl. 57*. *S. oligosperma*, *Col. in Trans. N.Z. Inst. xviii. (1886) 257*. *S. pellucida*, *Col. l.c. xxvii. (1895) 383*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout in both lowland and mountain districts, ascending to over 4000 ft.

Mr. Colenso's herbarium contains numerous examples of his *S. oligosperma* and *S. pellucida*, but I can find no characters to distinguish them from the ordinary form of the species, even as varieties.

2. ***S. decipiens***, *Hook. f. Fl. Antarct. i. 7*.—A pale-green much and loosely branched decumbent herb, forming matted patches. Leaves $\frac{1}{4}$ – $\frac{2}{3}$ in. long, orbicular or orbicular-ovate or broadly obovate, rather fleshy, acute or apiculate, with a callous tip, narrowed into a broad and slightly ciliate petiole. Peduncles axillary, usually 2-flowered, generally longer than the leaves; a pair of bracts at the fork of the peduncle and another on one of the pedicels. Flowers small, rather larger than those of *S. parviflora*. Sepals 5, oblong-ovate, obtuse or subacute. Petals 5, 2-cleft to the base, shorter than the sepals, often wanting. Capsules $\frac{1}{3}$ longer than the sepals, oblong-ovoid, deeply 6-valved. Seeds dark red-brown, tuberculate.—*Hook. f. Ic. Plant. t. 680*; *Handb. N.Z. Fl. 23*; *Kirk, Students' Fl. 57*.

Var. **angustata**, *Kirk, l.c.*—Leaves narrower than in the type, linear-lanceolate, acute or acuminate.

AUCKLAND AND CAMPBELL ISLANDS: Woods near the sea, not uncommon, *Hooker, Kirk! Chapman!* MACQUARIE ISLAND, *A. Hamilton.* Var. *angustata*: ANTIPODES ISLAND, *Kirk!*

A larger plant than the preceding, with more fleshy stems and leaves, larger flowers, and larger and more coarsely tuberculate seeds. It much resembles the European *S. media*, but can always be distinguished by the less developed inflorescence and by the absence of the pubescent line on the branches.

3. **S. minuta**, *Kirk, Students' Fl.* 57. — "Annual. Stems $\frac{1}{2}$ –1 in. high, narrowly winged, branched, glabrous, ciliate. Leaves ovate, acuminate or acute, narrowed into a short broad petiole; apex callous. Peduncles axillary, 1–2-flowered, with a pair of bracts at the base of the naked pedicels, not diverging. Sepals broadly oblong, obtuse. Petals 5, shorter than the sepals, 2-fid nearly to the base. Stamens 8, rarely 10. Capsule not seen."

SOUTH ISLAND: Mount Stokes, 3000 ft., *J. Macmahon!* Westport, on the sea-beach, *Dr. Gaze* (a scrap only).

The specimens of this in Mr. Kirk's herbarium are few and imperfect, and I have consequently reproduced his description. He remarks that it is "distinguished from all forms of *S. parviflora*, *S. decipiens*, and *S. elatinoides* by the broadly obtuse sepals, and from *S. media* by its solitary or geminate flowers and the absence of the hairy line on the stems and branches." It looks to me much like a reduced form of *S. parviflora*.

4. **S. elatinoides**, *Hook. f. Fl. Nov. Zel.* i. 25. — A small glabrous pale-green herb; stems 1–3 in. long, branched, decumbent at the base, ascending or suberect at the tips. Leaves $\frac{1}{10}$ – $\frac{1}{5}$ in. long, linear or linear-oblong, acute or subacute, narrowed into a short flat petiole. Flowers small, $\frac{1}{10}$ in. diam., axillary and solitary, sessile or on short peduncles. Sepals ovate-lanceolate or subulate-lanceolate, acuminate, with white scarious margins. Petals absent in all the flowers examined. Stamens 5 or 10. Capsule ovoid, as long as the sepals, 6-valved to the middle. Seeds 6–12, red-brown, covered with large rounded tubercles.—*Handb. N.Z. Fl.* 23; *Kirk, Students' Fl.* 58.

NORTH ISLAND: Hawke's Bay—Lake Rotoatara and Cape Kidnappers, *Colenso.* SOUTH ISLAND: Otago—Duntroon, Sowburn, Tuapeka Mouth, Speargrass Flat, *Petrie!* November.

Easily recognised by the small size, narrow leaves, acuminate sepals, almost sessile flowers, and coarsely tubercled seeds. The above description is drawn up from Mr. Petrie's Otago specimens, the plant not having been seen in the North Island since Mr. Colenso's original discovery of it more than fifty years ago. It is very closely allied to the Tasmanian *S. multiflora*, if indeed not a form of that species.

5. **S. Roughii**, *Hook. f. Handb. N.Z. Fl.* 23. — An erect or straggling much-branched glabrous and succulent glaucous-green herb 2–6 in. high. Leaves $\frac{1}{2}$ –1 in. long, linear, acuminate, fleshy, 1-nerved. Flowers large, green, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{2}$ in. diam., on short

stout terminal peduncles. Sepals very large, almost foliaceous, lanceolate, acuminate, with 3 stout nerves. Petals much shorter than the sepals, cleft almost to the base. Stamens 10. Styles 3. Capsule about half as long as the sepals, 6-valved to the base. Seeds 12–20, red-brown, covered with large projecting papillæ.—*Kirk, Students' Fl.* 58.

SOUTH ISLAND: Nelson—Dun Mountain, *Rough! T. F. C.*; Wairau Gorge, *Travers*; Mount Captain, *Kirk!* Clarence Valley and Lake Tennyson, *T. F. C.* Canterbury—Mount Torlesse, *Haast, Petrie, T. F. C.*; Broken River and Upper Waimakariri, *Enys! Kirk! T. F. C.* Altitudinal range 3000 to 6000 ft. December–February.

One of the most distinct species of the genus, remarkable for its fleshy glaucous habit, large green flowers, and the large papillæ on the seeds. It appears to be confined to bare shingle-slopes on the mountains.

6. *S. gracilenta*, *Hook. f. Fl. Nov. Zel.* ii. 326.—A loosely tufted rigid and wiry yellow-green herb 1–5 in. high; stems sub-erect, slightly scabrid, often matted and interlaced. Leaves opposite, glabrous, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, linear-subulate, curved, concave above, smooth and convex below when moist, when dry grooved on each side of the stout midrib; tip rigid, terete, acute; margins thickened, slightly ciliate at the base, not revolute; each stem-leaf with a small fascicle of leaves in its axil. Peduncles springing from the axils of the uppermost leaves, 1–3 in. long, solitary, strict, erect, 1-flowered, 2-bracteolate about the middle. Flowers $\frac{1}{3}$ in. diam., greenish-white. Sepals oblong, acute, with broad membranous margins. Petals 5, rather longer than the sepals, 2-cleft almost to the base. Stamens 5–10. Styles 3. Capsule ovate-oblong, 6-valved; seeds pale-brown, papillose.—*Handb. N.Z. Fl.* 24; *Kirk, Students' Fl.* 58.

SOUTH ISLAND: Not uncommon in mountain districts, ascending to 5000 ft. Descends to sea-level at the mouth of the Waitaki River. November–February.

Easily recognised by the strict wiry habit, subulate leaves, and very long erect peduncles.

3. *COLOBANTHUS*, Bartling.

Small densely tufted usually rigid glabrous herbs. Leaves opposite, narrow-linear or subulate, usually imbricate, rigid, cartilaginous, rarely fleshy. Flowers green, solitary, on short or long peduncles. Sepals 4–5, coriaceous, erect. Petals wanting. Stamens 4–5, alternating with the sepals, slightly perigynous. Capsule ovoid or oblong, opening by as many valves as sepals.

A small genus of about 15 species, most numerous in New Zealand, but found also on the mountains of South America, in Australia and Tasmania, and in the Antarctic islands. Of the 9 species found in New Zealand, all but 3 are endemic. The species are highly variable, and most of them extremely difficult of discrimination.

Colobanthus repens, Col. in Trans. N.Z. Inst. xix. 261, and *C. cæspitosus*, Col. l.c. xxvii. 384, are respectively *Sagina procumbens*, Linn., and *S. apetala*, Linn., as proved by the type specimens in Mr. Colenso's herbarium. It is curious that such an acute observer as Mr. Colenso should have overlooked that the stamens are opposite to the sepals in both these plants, and not alternate, as is the case in all true *Colobanthi*. Both the above species of *Sagina* are now copiously naturalised throughout the colony.

* Flowers tetramerous.

- | | |
|--|--------------------------|
| Soft, bright-green. Leaves $\frac{1}{10}$ – $\frac{1}{4}$ in., linear, obtuse, almost fleshy. Sepals ovate-lanceolate, obtuse | 1. <i>C. muscoides</i> . |
| Branched, leafy. Leaves flaccid, $\frac{1}{4}$ – $\frac{3}{8}$ in., acute or mucronate, but not acicular. Sepals ovate, obtuse | 2. <i>C. quitensis</i> . |

** Flowers pentamerous.

- | | |
|---|---|
| Leaves grassy, often flaccid, acicular. Sepals ovate, acute or acuminate, but slightly exceeding the capsule | 3. <i>C. Billardieri</i> . |
| Leaves rigid, usually spreading, acicular. Sepals acicular, much longer than the capsule | 4. <i>C. Muellieri</i> . |
| Leaves densely imbricate, small, $\frac{1}{10}$ – $\frac{1}{4}$ in., obtuse at the tip, with a short acicular point. Sepals about equal to the capsule | 5. <i>C. brevisepalus</i> . |
| Leaves densely imbricate, $\frac{1}{8}$ – $\frac{1}{4}$ in., strict, narrowed into short acicular points. Sepals about equal to the capsule | 6. <i>C. Benthami-</i>
<i>anus</i> . |
| Leaves densely imbricate, $\frac{1}{4}$ – $\frac{3}{8}$ in., curved, narrowed into very long acicular points. Sepals much longer than the capsule | 7. <i>C. acicularis</i> . |
| Leaves loosely imbricate, $\frac{1}{8}$ – $\frac{1}{4}$ in., spreading or recurved, chaffy, acute or shortly acicular. Sepals 5, ovate, acute, about equal to the capsule | 8. <i>C. canaliculatus</i> . |
| Leaves barely imbricate, loosely spreading, membranous, $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Peduncles axillary. Sepals linear-subulate, much longer than the capsule | 9. <i>C. Buchanani</i> . |

1. *C. muscoides*, Hook. f. *Fl. Antarct.* i. 14.—A soft almost flaccid perfectly glabrous densely tufted bright-green plant, forming large irregular patches. Stems numerous, branched, densely matted and compacted. Leaves closely imbricated, connate at the base, spreading or ascending, $\frac{1}{10}$ – $\frac{1}{4}$ in. long, linear from a broad base, obtuse at the tip. Flowers minute, on short peduncles which are sunk amongst the uppermost leaves or shortly exerted in fruit. Sepals 4, ovate-lanceolate, obtuse, concave, obscurely keeled at the back. Capsule shorter than the sepals.—*Handb. N.Z. Fl.* 25; *Kirk, Students' Fl.* 62; *Homb. and Jacq. Voy. au Pôle Sud, Bot.* t. 17.

THE SNARES, AUCKLAND, CAMPBELL, ANTIPODES, AND MACQUARIE ISLANDS : Common on rocks near the sea.

Forms rounded patches sometimes 18 in. across, although usually much smaller, the inner part composed of the decaying foliage and stems of old plants, the outside thickly covered with the compacted stems and branches, clothed with bright-green leaves.

2. *C. quitensis*, Bartl. in *Presl. Reliq. Haenk.* ii. 13, t. 49, f. 2.—A small densely tufted much-branched plant 1–2 in. high, forming rather soft rounded patches. Leaves variable in size, lower some-

times over $\frac{1}{2}$ in. long, upper often very small, $\frac{1}{8}$ – $\frac{1}{4}$ in., narrow-linear or linear-subulate, acute or mucronate but not acicular at the tip, connate at the base, flat or concave above, convex beneath; texture soft. Peduncles short, stout, terminal. Flowers $\frac{1}{8}$ – $\frac{1}{6}$ in. long. Sepals 4, ovate, broad at the base, obtuse at the tip, rather thick. Capsule $\frac{1}{3}$ shorter than the sepals.—*Hook. f. Handb. N.Z. Fl.* 24; *Kirk, Students' Fl.* 60.

SOUTH ISLAND: Nelson—Dun Mountain Range, Mount Arthur, Raglan Mountains, *T. F. C.*; Wairau Mountains, *Travers.* Canterbury—Kowai River, *Haast.* Otago—*Buchanan!* Altitudinal range 1500 to 4500 ft. Also in South America, from Mexico to Cape Horn.

A well-marked species, at once recognised by the soft leaves, which never have acicular points, by the tetramerous flowers, and by the broad obtuse sepals.

3. **C. Billardieri**, *Fenzl. in Ann. Wien Mus.* i. 49.—A small densely tufted perennial $\frac{1}{2}$ – $1\frac{1}{2}$ in. high, rarely more. Leaves in crowded tufts, usually grassy, often flaccid, very variable in length, sometimes 1 in. long, very narrow linear or filiform, at other times shorter, $\frac{1}{4}$ in., linear-subulate; broad and membranous at the base and sheathing the stem, gradually narrowed upwards, acute or acicular at the tip. Peduncles springing from the centre of the leaf-tufts, longer or shorter than the leaves, usually elongating in the fruiting stage. Sepals 5, ovate, acute or acuminate, as long as or rather longer than the capsule. Capsule broadly ovoid, obtuse.—*Hook. f. Fl. Antarct.* i. 14; *Fl. Nov. Zel.* i. 27; *Fl. Tasm.* i. 45; *Handb. N.Z. Fl.* 25; *Benth. Fl. Austral.* i. 161; *Kirk, Students' Fl.* 60.

Var. **alpinus**, *Kirk, l.c.*—Larger, forming tufts sometimes 4 in. diam. Leaves 1–2 in., with acicular tips. Peduncles 2–4 in. long in fruit. Sepals ovate, acuminate, rather longer than the capsule.

NORTH ISLAND: Mount Hikurangi, *Adams* and *Petrie!* Ruahine Mountains, *Colenso*; Tararua Range, *Buchanan*; Mount Egmont, *T. F. C.* SOUTH ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, MACQUARIE ISLAND: Abundant throughout. Altitudinal range from sea-level to 4500 ft. November–February. Also found in Victoria and Tasmania.

Separated from *C. quitensis* by the different habit, acicular tips to the leaves, pentamerous flowers, and pointed sepals. From *C. Muelleri* it can be distinguished by the grassy and often flaccid leaves and shorter sepals, which last are not acicular: but some forms are very difficult to place.

4. **C. Muelleri**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 356.—A small densely tufted perfectly glabrous plant, $\frac{1}{4}$ – $1\frac{1}{2}$ in. high. Leaves rigid, cartilaginous, spreading, often recurved, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-subulate, broadly channelled above, convex below, narrowed into short acicular tips. Peduncles terminal or lateral, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, stout, often hidden among the leaves. Sepals 5, ovate or ovate-lanceolate, suddenly narrowed into cartilaginous points with acicular tips, about $\frac{1}{3}$ longer than the capsule.—*Students' Fl.* 60. *C. Billardieri* var. *brachypoda*, *F. Muell. Veg. Chath. Is.* 11.

? var. **strictus**, *Cheesem.*—Larger, sometimes forming patches 2 in. diam. Leaves strict, erect, often more than 1 in. long. Peduncles equalling or exceeding the leaves. Sepals ovate-lanceolate, narrowed into long acicular points, nearly half as long again as the capsule.

? var. **multicaulis**, *Kirk, Students' Fl.* 61. — Rigid, much branched, branches naked below. Leaves rather lax, spreading, linear-subulate, $\frac{1}{4}$ in. long. Peduncles about as long as the leaves. Sepals narrow-ovate, acute or mucronate, equalling the capsule.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLAND: The typical form not uncommon from the East Cape southwards, usually on cliffs or shingly beaches. Var. *strictus*: Mountains of Canterbury and Otago, *T. F. C., Petrie!* Var. *multicaulis*: Interior of Otago, *Buchanan!*

A puzzling plant. As characterized above, it is distinguished from *C. Billardieri* by the rigid habit, harsh often cartilaginous leaves, and especially by the rigid acicular sepals, which are much longer than the capsule. The two varieties, when better known, may prove distinct.

5. **C. brevisepalus**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 357, t. 27E.—A small densely tufted much-branched plant, forming compact rounded cushions 1–2 in. diam. Leaves densely imbricated, straight or curved, smooth and shining, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, base broad and membranous, sheathing the stem, suddenly narrowed into the upper part, which is subulate, concave above, convex below, obtuse and almost tumid at the tip, abruptly produced into a short acicular point. Flowers terminal, sunk amongst the leaves. Sepals 5, ovate-subulate, convex or almost keeled, equalling or slightly longer than the oblong capsule.—*Students' Fl.* 61.

SOUTH ISLAND: Marlborough—Mount Mowatt, *Kirk!* Canterbury—Mountains near Lake Tekapo, *T. F. C.* Otago—Kurow, Speargrass Flat, Cromwell, Queenstown, &c., *Petrie!* Ascends to nearly 6000 ft.

This appears to be a well-marked form, recognised without any difficulty by the short densely imbricated leaves with obtuse tips furnished with a fine hair-point.

6. **C. Benthamianus**, *Fenzl in Ann. Wien Mus.* i. 49. — A small densely tufted moss-like plant, forming small rounded patches about 1 in. high. Leaves densely imbricated, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, subulate, strict and rigid, tapering from the base to a shortly acicular apex, channelled above, convex below, sometimes with a groove between the margin and midrib. Peduncles short; flowers slightly exceeding the uppermost leaves. Sepals 5, ovate-subulate, thickened at the base, acute or very shortly mucronate, equalling or very slightly exceeding the capsule.—*Kirk, Students' Fl.* 61. *C. subulatus*, *Hook. f. Fl. Antarct.* i. 13 and ii. 247, t. 93; *Handb. N.Z. Fl.* 25; *Benth. Fl. Austral.* i. 160.

SOUTH ISLAND: "Awatere Valley, and rocky places, Sinclair Range, alt. 4000 ft., *Sinclair* and *Haast*; Otago—Lake District, *Hector* and *Buchanan.*" CAMPBELL ISLAND: *Hooker, Kirk!* Also found in Victoria and antarctic America.

Like Mr. Kirk, I have not seen any South Island specimens that I can refer to this species, although small forms of *C. acicularis* have frequently been mistaken for it. *C. Benthamianus* appears to me to constantly differ from *C. acicularis* in the shorter and more strict leaves, with much shorter acicular points, and in the broader and shorter sepals, which can hardly be called acicular, and barely exceed the capsule. In *C. acicularis* the sepals are narrower, and have long acicular apices much exceeding the capsule.

7. *C. acicularis*, Hook. f. *Handb. N.Z. Fl.* 25.—A perfectly glabrous densely tufted rigid and shining plant, forming green or brownish rounded tufts 3–6 in. diam. and 1–3 in. high. Leaves very numerous, densely imbricated all round the branches, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-subulate, often curved, broad and sheathing at the base, gradually narrowed into very long acicular points, channelled above, convex and smooth below. Flowers almost sessile amongst the uppermost leaves, than which they are shorter. Sepals 5, narrow linear-subulate, narrowed into long acicular tips, at least $\frac{1}{3}$ longer than the capsule.—*Kirk, Students' Fl.* 62.

SOUTH ISLAND: Dry rocky places in the mountains, abundant throughout. Altitudinal range from 1500 ft. to 6000 ft.

Well characterized by the robust stems and branches, long leaves with remarkably long acicular points, almost sessile flowers, and long sepals, which much exceed the capsule.

8. *C. canaliculatus*, T. Kirk in *Trans. N.Z. Inst.* xxvii. (1895) 357. — A small densely tufted much-branched plant, forming rounded cushions 3–4 in. diam. and 2 in. high, occasionally more laxly branched and open. Leaves in opposite pairs with broad connate sheathing bases, $\frac{1}{5}$ – $\frac{1}{5}$ in. long, rigid or chaffy, spreading, subulate, gradually narrowed into an acute or shortly acicular tip, deeply channelled above, convex below, margins thickened. Flowers $\frac{1}{5}$ in., terminating short lateral branchlets in the axils of the uppermost leaves. Sepals 5, broadly ovate, acute or subacute, margins thin and almost translucent. Stamens 5, longer than the sepals. Hypogynous disc reduced to a thickened line. Capsules equal to or rather shorter than the sepals. — *Students' Fl.* 61. *C. squarrosus*, Cheesem. in *Trans. N.Z. Inst.* xxviii. (1896) 534.

SOUTH ISLAND: Nelson—Mount Owen, on limestone rocks, alt. 4000 ft., T. F. C., W. Townson! Otago—Buchanan!

A well-marked plant, the chief characters of which are the short spreading chaffy leaves, either acute or very shortly acicular, the short stout lateral peduncles, and the broadly ovate sepals.

9. *C. Buchananii*, T. Kirk in *Trans. N.Z. Inst.* xxvii. (1895) 358, t. 27D.—Apparently a laxly tufted plant 2–3 in. high, with slender erect stems. Leaves not imbricating, loosely spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-subulate, sheathing at the base, membranous, concave above, convex below, gradually narrowed into short acicular points. Peduncles axillary, slender, usually rather longer than the leaves. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. long. Sepals 5, linear-subulate, acuminate, half as long again as the short capsule.—*Students' Fl.* 62.

SOUTH ISLAND : Otago—Manuherikia Valley, *Buchanan* !

A most distinct plant, of which I have only seen three imperfect specimens. The slender stems, loosely spreading membranous leaves, and axillary peduncles give it a very different aspect from that of any other New Zealand species.

4. **SPERGULARIA**, Pers.

Spreading or prostrate herbs. Leaves linear or setaceous, often with smaller ones fascicled in the axils so as to appear verticillate. Stipules small, scarious. Flowers white or pink, pedicelled, in subracemose cymes. Sepals 5. Petals 5, entire, rarely wanting. Stamens 10 or fewer by abortion. Ovary 1-celled, many-ovuled; styles 3. Capsules 3-valved; seeds compressed, often winged.

A genus of 5 or 6 species, widely spread in temperate or subtropical regions, chiefly near the sea-coast or in saline localities. The single New Zealand species has a very extensive range.

1. **S. media**, Presl. *Fl. Sic.* 17.—A rather succulent much-branched prostrate or suberect herb, more or less viscid-pubescent; stems 2–6 in. long. Leaves narrow-linear, semi-terete, $\frac{1}{3}$ –1 in. long, fleshy, quite entire, acute; stipules broadly ovate, acuminate, conspicuous. Flowers many, axillary and terminal, on slender glandular peduncles $\frac{1}{3}$ –1 in. long. Sepals lanceolate, with a broad white membranous border. Petals usually shorter than the sepals. Capsule exceeding the sepals. Seeds more or less flattened, often surrounded by a broad membranous wing.—*Kirk, Students' Fl.* 63. *S. rubra* var. *marina*, Hook. f. *Handb. N.Z. Fl.* 25. *Arenaria media*, Linn. *Sp. Plant.* 606; *A. Cunn. Precur.* n. 609; Hook. f. *Fl. Nov. Zel.* i. 26.

NORTH AND SOUTH ISLANDS, STEWART ISLAND : Common on the coast, from the Three Kings Islands and the North Cape southwards. October–February. An abundant plant near the sea in many parts of the world.

The allied species *S. rubra*, Presl., which has more slender and flatter leaves, smaller flowers, and seeds not so conspicuously margined, is naturalised in several places in both the North and South Islands, but is usually found in inland localities.

ORDER VII. **PORTULACÆÆ.**

Herbs, usually fleshy and glabrous, occasionally clothed with long hairs. Leaves opposite or rarely alternate, entire, generally exstipulate. Flowers regular, hermaphrodite. Sepals 2, rarely more, imbricate. Petals 4–5, hypogynous or rarely perigynous, free or united below. Stamens either equal in number to the petals and opposite to them or indefinite, often adnate to the base of the petals. Ovary free or rarely half-inferior, 1-celled; style 3–8-fid; ovules few or many, affixed to a free central or basal placenta. Fruit a capsule, either dehiscing with as many valves as style-

branches, or opening by a transverse lid. Seeds 1 to many; embryo curved round a farinaceous albumen.

A small order, having its headquarters in America; found more sparingly in South Africa and Australia; decidedly rare in Asia, north Africa, and Europe. Genera 16; species about 125. Some of the American genera are shrubby; and the widely distributed *Portulaca* (naturalised in New Zealand) differs from the rest of the order in having perigynous petals and stamens, and a half inferior ovary. Of the New Zealand genera, *Hectorella* is endemic, *Claytonia* is mainly American, and *Montia* occurs in the temperate regions of both hemispheres.

Stems slender. Stamens 5, opposite the petals. Capsule	
3-many-seeded, seeds shining	1. CLAYTONIA.
Stems slender. Stamens usually 3, opposite the petals.	
Capsule 1-3-seeded, seeds dull and opaque	2. MONTIA.
Alpine herb with densely tufted stems. Stamens 5, alternate with the petals	3. HECTORELLA.

1. CLAYTONIA, Linn.

Annual or perennial low-growing glabrous and succulent herbs. Radical leaves petiolate, cauline opposite or alternate. Flowers solitary or in terminal or axillary racemes or cymes. Sepals 2, persistent. Petals 5, hypogynous. Stamens 5, adhering to the petals at the base. Ovary free; ovules few; style 3-cleft. Capsule globose or ovoid, membranous, 3-valved. Seeds reniform or orbicular, flattened.

Species about 20, all from North America or north-eastern Asia with the exception of the following one, which is confined to Australia and New Zealand.

1. *C. australasica*, Hook. f. in Hook. Ic. Plant. t. 293. — A perfectly glabrous tender and succulent usually matted plant, with slender creeping stems 1-6 in. long. Leaves very variable in size, $\frac{1}{4}$ - $1\frac{1}{2}$ in. long, alternate or in distant pairs, narrow-linear or linear-spathulate, obtuse, dilated into broad membranous sheaths at the base. Flowers large, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., white or rose, terminal or leaf-opposed, solitary or in few-flowered lax racemes; pedicels long, slender. Sepals small, broadly orbicular. Petals much longer, broad-obovate. Capsule globose, mucronate, usually slightly exceeding the sepals. Seeds generally 3, black, smooth and shining. — *Fl. Nov. Zel.* i. 73; *Handb. N.Z. Fl.* 26; *Benth. Fl. Austral.* i. 177; *Kirk, Students' Fl.* 65.

NORTH ISLAND: Ruahine Range and Ruapehu, *H. Hill! Petrie! E. W. Andrews*; Mount Egmont, *Buchanan, T. F. C.* SOUTH ISLAND AND STEWART ISLAND: Common in mountain districts throughout. Ascends to over 6000 ft. on Mount Egmont, and descends to sea-level in Otago and Stewart Island.

A variable plant. When growing in dry or exposed places it is often very small and densely tufted; but in watery situations the stems lengthen out considerably and the leaves become longer. Mr. Buchanan (*Trans. N.Z. Inst.* iii. 210) has described two varieties characterized by the peduncles in one being 2-flowered, and in the other racemose; but I find the number of flowers to be very inconstant.

2. **MONTIA**, Linn.

A small glabrous herb. Leaves opposite, slightly fleshy. Flowers small, axillary or shortly racemose. Sepals 2, ovate, persistent. Petals 5, united at the base into a 5-lobed corolla, split open on one side. Stamens 3, rarely 5, inserted on the petals. Ovary free; ovules 3. Capsule globose, 3-valved, 3-seeded. Seeds nearly orbicular.

A monotypic genus, widely distributed in the north and south temperate zones.

1. *M. fontana*, Linn. *Sp. Plant.* 87. — A slender perfectly glabrous branching herb, forming dense tufts 1–5 in. high, sometimes longer and weaker when growing in water. Leaves opposite, $\frac{1}{4}$ –1 in. long, linear-lanceolate or spathulate, acute or subacute, quite entire. Flowers minute, solitary or in 2–3-flowered racemes, drooping. Petals slightly longer than the sepals. Capsules small.—*Hook. f. Fl. Antarct.* 13; *Fl. Nov. Zel.* i. 74; *Handb. N.Z. Fl.* 27; *Kirk, Students' Fl.* 65.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND, CAMPBELL, ANTIPODES, AND MACQUARIE ISLANDS: Abundant in watery places, from Rotorua and Taranaki southwards. Altitudinal range from sea-level to 4000 ft.

3. **HECTORELLA**, Hook. f.

A small densely tufted glabrous perennial. Leaves small, densely imbricated, coriaceous, entire. Flowers almost sessile amongst the uppermost leaves. Sepals 2, short, truncate. Petals 5, connate at the base, thickened below the tip. Stamens 5, inserted on the tube of the corolla, and alternate with the petals; anthers linear-oblong. Ovary free; ovules 4–5, erect from the base of the cell; funicles slender; style erect; stigmas 1–3, linear, papillose. Capsule membranous, equalling the sepals; seeds 2–4.

A monotypic genus confined to New Zealand; not closely allied to any other.

1. *H. cæspitosa*, Hook. f. *Handb. N.Z. Fl.* 27.—Stems short, stout, densely tufted, with the leaves on almost as thick as the little finger, forming compact rounded cushions 2–8 in. diam. and 1–3 in. high. Leaves very numerous, closely imbricated in many series, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, broadly triangular-ovate to linear-oblong with a broad base, thin and membranous below the middle, coriaceous and keeled above; margins and tip thickened; veins reticulated. Flowers small, white, very shortly peduncled, forming a ring round the top of the branches among the uppermost leaves, often unisexual, the staminate ones being the smallest. Sepals concave, keeled. Petals much longer than the sepals. Capsule globose, membranous, as long as the sepals. Seeds 2–4, broadly ovoid, smooth and shining.—*Hook. f. in Hook. Ic. Plant.* t. 1046; *Kirk,*

Students' Fl. 65. *H. elongata*, Buch. in *Trans. N.Z. Inst.* xvi. (1884) 395, t. 35.

SOUTH ISLAND: Canterbury—Mountains above Arthur's Pass, *T. F. C.*; Mount Cook district, *F. G. Gibbs*, *T. F. C.* Otago—Mount Alta; Mount Aspiring, *Hector* and *Buchanan*! Hector Mountains, Dunstan Mountains, and all high mountains west of the Clutha River, *Petrie*! Altitudinal range from 4000 to 6500 ft.

Mr. Buchanan's *H. elongata*, based on more laxly branched specimens with longer linear-oblong leaves, looks different at first sight, but (as Mr. Kirk has remarked) is connected with the typical state by numerous transitional forms.

ORDER VIII. ELATINEÆ.

Small herbs or undershrubs, usually growing in wet places. Leaves opposite, stipulate. Flowers minute, regular, hermaphrodite. Sepals and petals each 2-5, free, imbricate. Stamens equal in number to the petals or twice as many, hypogynous, free; anthers versatile. Ovary free, 2-5-celled; styles as many as the cells, free from the base; stigmas capitate; ovules many, attached to the inner angles of the cells, anatropous. Capsule septicidal, the valves falling away from the persistent axis and septa. Seeds straight or curved; albumen wanting, or nearly so; embryo terete, radicle next the hilum.

A small and unimportant order, spread over the whole world. Genera 2; species about 25.

1. ELATINE, Linn.

Small prostrate glabrous annuals, growing in water or wet places. Leaves opposite or whorled. Flowers small, axillary, usually solitary. Sepals 2-4, membranous, obtuse. Petals the same number. Ovary globose. Capsule membranous, the septa remaining attached to the axis or evanescent. Seeds cylindric, straight, or curved, longitudinally ridged and transversely wrinkled.

Species about 6, found in most temperate and subtropical regions.

1. *E. americana*, Arn. in *Edinb. Journ. Nat. Sc.* i. 431, var. *australiensis*, Benth. *Fl. Austral.* i. 178.—A small prostrate smooth and glabrous green or reddish annual, forming matted patches 1-4 in. diam.; stems branched, rooting at the nodes, succulent. Leaves small, shortly petioled, $\frac{1}{8}$ - $\frac{1}{3}$ in. long, ovate or obovate or oblong, obtuse; margin usually furnished with a few distant glands; stipules minute, fugacious. Flowers minute, solitary, sessile. Sepals 3, obtuse. Petals often absent, when present 3, longer than the sepals. Styles 3. Stamens usually 3. Capsule globose-depressed, septa complete or evanescent at maturity. Seeds very minute.—*Kirk*, *Students' Fl.* 66. *E. americana*, Hook. f. *Fl. Nov. Zel.* i. 27; *Handb. N.Z. Fl.* 28. *E. gratioloides*, A. Cunn. *Precur.* n. 610.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Muddy places and margins of still waters, not uncommon.

The New Zealand plant, which is also found in Australia, differs from the typical form of the species, which is North American, in the flowers being always trimerous, while in America they are usually dimerous.

ORDER IX. HYPERICINEÆ.

Herbs or shrubs, rarely trees. Leaves opposite or occasionally whorled, generally furnished with pellucid glands or dark glandular dots, simple, entire or with glandular teeth; stipules wanting. Flowers regular, hermaphrodite, solitary or in cymes, terminal or rarely axillary. Sepals 5, rarely 4, imbricate. Petals the same number, hypogynous, imbricate and usually contorted. Stamens numerous, rarely few, hypogynous, usually united into 3 or 5 bundles. Ovary either 1-celled with 3-5 parietal placentas, or 3-5-celled from the union of the placentas in the axis; styles 3-5; ovules few or many, anatropous. Fruit capsular, rarely succulent. Seeds without albumen; embryo straight or curved, radicle next the hilum.

A rather small but widely dispersed order, comprising 8 or 9 genera and about 220 species. Most of the species secrete an abundant resinous juice. The single New Zealand genus is widely spread in both temperate and tropical regions.

1. *HYPERICUM*, Linn.

Herbs or shrubs. Leaves opposite or rarely whorled, thin, usually sessile, entire or rarely minutely toothed. Flowers generally yellow, solitary or cymose, terminal or axillary. Sepals 5. Petals 5, smooth within. Ovary either 1-celled with 3-5 parietal placentas, or 3-5-celled through the placentas meeting in the axis; styles distinct or united at the base; ovules usually numerous. Capsule septicidal or dehiscent at the placentas. Seeds not winged.

A rather large genus comprising over 160 species, widely dispersed, but particularly abundant in south Europe, western Asia, and North America.

Erect or nearly so. Leaves subcordate at the base, with

revolute margins 1. *H. gramineum*.

Procumbent. Leaves oblong or obovate, margins flat .. 2. *H. japonicum*.

1. *H. gramineum*, *Forst. Prodr.* n. 281.—A perfectly glabrous strict and wiry perennial 4-12 in. high or more. Stems branched from the base, erect or ascending, 4-angled, sparingly leafy. Leaves $\frac{1}{3}$ – $\frac{3}{4}$ in. long, rarely more, oblong or oblong-lanceolate, cordate at the base and stem-clasping, obtuse, quite entire, marked with numerous pellucid dots; margins more or less revolute. Flowers $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., sometimes solitary in small specimens, but usually in terminal trichotomous cymes, with a pair of bracts at the base of each fork; pedicels strict, erect. Sepals oblong-lanceolate, acute or obtuse. Petals longer than the sepals, golden-yellow. Capsule ovoid, acute, 1-celled, 3-valved, usually longer than the sepals.—

Hook. f. Fl. Nov. Zel. i. 36; Handb. N.Z. Fl. 29; Benth. Fl. Austral. i. 182; Kirk, Students' Fl. 67. Brathys Forsteri, Spach in Ann. Sc. Nat. ser. 2, v. 367; Raoul, Choix de Plantes, 47.

NORTH AND SOUTH ISLANDS: From Whangaroa North (*Petrie!*) to the south of Otago, but rare and local to the north of Hawke's Bay. Altitudinal range from sea-level to 2000 ft. Also found in Australia and Tasmania, and in New Caledonia.

2. *H. japonicum*, *Thunb. Fl. Jap. 295, t. 31.*—A slender procumbent or diffuse much or sparingly branched plant 2–6 in. high; branches ascending at the tips. Leaves small, $\frac{1}{6}$ – $\frac{1}{3}$ in., broadly oblong or oblong-ovate or obovate-oblong, obtuse, quite entire, often glaucous, marked with pellucid dots, sessile; margins usually flat. Flowers smaller than in *H. gramineum*, solitary or in few-flowered cymes; pedicels short, slender. Sepals oblong or ovate, obtuse or subacute. Petals slightly exceeding the sepals. Capsule broadly ovoid, small.—*Hook. f. Fl. Nov. Zel. i. 37; Handb. N.Z. Fl. 29; Benth. Fl. Austral. i. 182; Kirk, Students' Fl. 67. H. pusillum, Choisy, Prodr. Hyp. 50; A. Cunn. Precur. n. 596.*

NORTH AND SOUTH ISLANDS: Not uncommon in moist places from the North Cape to Otago. Altitudinal range from sea-level to over 3000 ft.

Extends northwards through Australia and the Malay Archipelago to India, China, and Japan. Very closely allied to the preceding, but usually readily distinguished by its procumbent habit, broader flatter obtuse leaves and smaller fewer flowers. (The European *H. humifusum*, Linn., has become naturalised in many places, and may easily be mistaken for *H. japonicum*. It is usually larger, with stiffer and more wiry stems and branches, larger and more pointed leaves which have a row of black glandular dots just inside the margin, and larger flowers with more pointed often glandular-toothed sepals.)

ORDER X. MALVACEÆ.

Herbs, shrubs, or soft-wooded trees, usually with tough fibrous inner bark, young parts frequently clothed with stellate hairs. Leaves stipulate, alternate, often palmately veined, entire or lobed or rarely compound. Flowers regular, hermaphrodite or rarely unisexual, often furnished at the base with a kind of involucrel composed of few or many free or connate bractlets. Sepals 5, valvate, more or less united into a lobed or entire calyx, persistent. Petals 5, hypogynous, contorted in the bud. Stamens many, hypogynous; filaments united into a tube surrounding the pistil usually called the staminal column; anthers reniform, 1-celled. Ovary 2–many-celled, of 2 to many carpels whorled round a common axis; carpels either distinct or united; ovules 1 or more to each carpel, attached to the inner angle. Fruit either of dry indehiscent or dehiscent cocci, or a capsule with loculicidal dehiscence. Seeds reniform or obovoid; albumen scanty or wanting; embryo often curved, cotyledons broad, foliaceous.

A large tropical and subtropical order, less common in temperate regions, and not extending either far north or south. Genera about 60; species between

700 and 800. Most of the species possess mucilaginous properties, and all are quite innocuous. Many are cultivated for ornament, and one genus (*Gossypium*) for the woolly covering which surrounds its seeds, and which constitutes the cotton of commerce. Of the 4 following genera, *Hoheria* is endemic; *Plagianthus* is found in Australia, and *Gaya* in South America; while *Hibiscus* is universal in warm countries.

A. Staminal column bearing anthers at the top. Carpels closely united in a ring around a central axis, from which they fall away when ripe (Malvæ).

Flowers more or less unisexual. Styles with linear decurrent stigmas. Carpels usually solitary in the New Zealand species 1. PLAGIANTHUS.

Flowers perfect. Stigmas capitate. Carpels several, indehiscent, winged at the back 2. HOHERIA.

Flowers perfect. Stigmas capitate. Carpels many, 2-valved, not winged 3. GAYA.

B. Staminal column bearing anthers at the side, naked and 5-toothed at the top. Carpels united into a capsule, dehiscing loculicidally (Hibiscæ).

Bracteoles 5 to many. Capsule 5-celled, many-seeded .. 4. HIBISCUS.

1. PLAGIANTHUS, Forst.

Trees or shrubs, rarely herbs. Leaves entire or lobed or serrate. Flowers usually small, hermaphrodite or unisexual, in axillary or terminal fascicles or panicles, or solitary. Bracteoles wanting, or small and distant from the calyx. Calyx 5-toothed or 5-fid. Staminal column split at the top into numerous filaments. Ovary 1-celled or 2-5-celled; ovules 1 in each cell; styles as many as the cells, clavate flattened or filiform, stigmatic along the inner side. Fruit of one or several carpels seceding from a common axis, indehiscent or splitting irregularly. Seed solitary, pendulous.

A small genus of about 12 species, confined to Australia and New Zealand, the species found in each country being endemic. The New Zealand species are practically dioecious, although a few hermaphrodite or female flowers are occasionally mixed with the males.

(*Plagianthus Lyallii*, Hook. f. Handb. N.Z. Flora, 30, is now referred to *Gaya*. *P. linariifolia*, Buch. in Trans. N.Z. Inst. xvi. (1884) 394, t. 34, is *Coprosma Kirkii*, Cheesem.)

Shrub, much branched. Leaves small, linear, entire.

Flowers solitary or fascicled. 1. *P. divaricatus*.

Small tree. Leaves linear-oblong, toothed. Flowers in few-flowered cymes. 2. *P. cymosus*.

Tree, 30-60 ft. Leaves ovate or ovate-lanceolate, serrate. Flowers numerous, in decomposed panicles 3. *P. betulinus*.

1. *P. divaricatus*, Forst. Char. Gen. 86.—A glabrous much-branched shrub 4-8 ft. high; branches tough, slender, divaricating, often much interlaced. Leaves alternate or fascicled on short lateral branchlets; of young plants 1 in. long, linear-oblong, narrowed into rather long petioles, entire or sinuate; of mature plants $\frac{1}{4}$ – $\frac{3}{4}$ in., narrow-linear or narrow linear-obovate, coriaceous, obtuse, quite entire, 1-nerved. Flowers very small, generally unisexual, yellowish-white, solitary or fascicled, axillary; peduncles shorter

than the leaves. Calyx hemispherical, 5-toothed. Petals small, oblong-obovate, veined. Staminal tube with 8-12 large sessile anthers. Ovary 1-celled, rarely 2-celled; ovules 1 in each cell; styles the same number as the cells, clavate or flattened. Fruiting carpel about the size of a peppercorn, globose or rarely didymous, downy, bursting irregularly. Seeds solitary, or very rarely 2.—*A. Rich. Fl. Nouv. Zel.* 299; *A. Cunn. Precur.* n. 604; *Raoul, Choix de Plantes*, 48; *Hook. Bot. Mag.* t. 3271; *Hook. f. Fl. Nov. Zel.* i. 29; *Handb. N.Z. Fl.* 30; *Buch. in Trans. N.Z. Inst.* xvi. t. 34, f. 2; *Kirk, Students' Fl.* 70.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in salt-water marshes from the North Cape to the Bluff. September-October.

In the male flowers the ovary is smaller, almost rudimentary, and the style altogether enclosed within the staminal column; in the females the style is exserted, and the anthers are smaller and usually empty.

2. *P. cymosus*, *T. Kirk, Students' Fl.* 70.—A small closely branched tree about 20 ft. in height, glabrous except a few scattered stellate hairs on the young shoots and branches of the inflorescence. Leaves alternate or in alternate fascicles, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, linear or linear-oblong or linear-obovate, obtuse or subacute, with a few deep serratures towards the tip; petioles slender, $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Flowers small, unisexual, in small axillary 5-15-flowered cymes, 1– $1\frac{1}{2}$ in. long, or in fascicles of 3-5, rarely solitary. Calyx campanulate, 5-toothed, narrower in the female flowers. Petals 5, ovate-spathulate or oblong-spathulate, much reduced in size in the females. Staminal column long and slender, with numerous anthers at the top. Ovary 1-2-celled; styles 1-2, clavate or broad and flattened. Fruiting carpels about $\frac{1}{2}$ in. diam., didymous or globose, downy, seated in the persistent calyx.

NORTH ISLAND: Auckland—Kaitaia, Mongonui County, *R. H. Matthews!*

SOUTH ISLAND: Canterbury—Upper Waimakariri, alt. 2800 ft., *J. D. Enys* (Kirk, "Students' Flora"). Otago—Near Dunedin, *G. M. Thomson! Petrie!* October.

A very peculiar plant, very distinct in habit and inflorescence, although the flowers closely agree in structure with those of *P. betulinus*, with the exception that the ovary is frequently 2-celled. It is remarkable that only one tree (a female) has been found in the Dunedin locality, and that only one (a male) is known at Kaitaia. The Waimakariri locality is given on the authority of Mr. Kirk. There are no specimens from thence in his herbarium.

3. *P. betulinus*, *A. Cunn. Precur.* n. 605.—A handsome leafy tree 30-60 ft. high, with a trunk sometimes 3 ft. in diam.; when young forming a straggling bush with interlaced tortuous branches. Bark exceedingly tough; branchlets, young leaves, petioles, and inflorescence more or less hoary with stellate hairs. Leaves of young plants small, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, broadly ovate or rounded to ovate-lanceolate, deeply and irregularly lobed or crenate-serrate. Leaves of mature plants 1-3 in. long, ovate or ovate-lanceolate, acuminate, coarsely crenate-serrate or doubly serrate, rounded or cuneate at

the base, membranous; petioles slender, $\frac{1}{2}$ –1 in. long. Flowers small, unisexual, very numerous, in terminal and axillary compound panicles 4–9 in. long; pedicels slender. Calyx campanulate, 5-toothed. Petals oblong-spathulate, obtuse, clawed, much smaller in the female flowers. Staminal column exserted in the males, long and slender, bearing numerous almost sessile anthers at the tip. Fruiting carpels $\frac{1}{6}$ in. diam., seated in the persistent veined calyx, ovoid, acuminate, downy. Seed solitary.—*Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 29; *Handb. N.Z. Fl.* 30; *Kirk, Forest Fl.* t. 103, 104; *Students' Fl.* 71. *P. urticinus*, *A. Cunn. Precur.* n. 606. *P. chathamica*, *Cockayne in Trans. N.Z. Inst.* xxxiv. (1902) 319 (name only). *Philippodendron regium*, *Poit. in Ann. Sc. Nat.* ser. ii. viii. t. 3.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Low-land forests from Mongonui and Kaitaia southwards, but often local. Ascends to 1500 ft. November–December. *Ribbon-wood* of Europeans; *manatu* of the Maoris.

Practically diœcious, although a few hermaphrodite flowers are sometimes mixed with the males. The male flowers are whitish-yellow, and are produced in immense profusion; the ovary is much reduced in size, and the style always included in the staminal column. The females are greenish, smaller and less numerous, the petals are smaller and adnate for some distance to the staminal column, the anthers are devoid of pollen, and the style exserted.

Mr. Cockayne separates his *P. chathamica* on the ground of its not passing through a young stage with foliage differing from that of the mature tree. Flowering specimens from the Chatham Islands in my herbarium have rather larger calyces than the type, but I can see no other difference. For a full description of the seedlings and young plants of both forms, reference should be made to Mr. Cockayne's paper, "An Inquiry into the Seedling Forms of New Zealand Phanerogams and their Development, Part IV." (*Trans. N.Z. Inst.* xxxiii. 273–282).

2. *HOHERIA*, A. Cunn.

A shrub or small tree. Leaves petiolate, alternate, serrate. Flowers numerous, in axillary fascicles, white; peduncles jointed at the middle. Bracteoles wanting. Calyx hemispherical, 5-toothed. Petals oblique, notched near the apex. Staminal column split at the top into numerous filaments, usually arranged in 5 bundles. Ovary 5-celled, rarely more; ovules 1 in each cell; style-branches as many as the cells, filiform; stigmas capitate. Fruiting carpels 5, placed round a central axis from which they fall away when ripe, indehiscent, furnished with a broad membranous wing at the back. Seed pendulous.

A genus confined to New Zealand. It is doubtful whether it should be regarded as composed of one highly variable species or of 3 or 4 closely allied ones.

1. *H. populnea*, A. Cunn. *Precur.* n. 600.—A small handsome tree 10–30 ft. high, glabrous except the young shoots, peduncles, and calyces, which are usually more or less pubescent; bark tough. Leaves extremely variable, especially in young plants, ranging from

ovate, ovate-oblong, or ovate-lanceolate to lanceolate or even linear, generally sharply and coarsely dentate or serrate, more rarely obtusely serrate; in young plants often deeply and irregularly lobed or toothed; petioles slender. Flowers in axillary fascicles, snow-white, usually produced in great profusion. Peduncles jointed, pubescent. Carpels produced outwards and upwards into a membranous wing, longer than broad.—*Hook. f. Fl. Nov. Zel. i. 30; Handb. N.Z. Fl. 31; Kirk, Students' Fl. 71.*

Can be most conveniently divided into the following 3 varieties, which possibly should have the rank of species:—

Var. *a*, **vulgaris**, *Hook. f. l.c.*—Leaves coriaceous, ovate, with large sharp teeth; blade 3–5 in. long; petioles 1–2 in. Leaves of young plants differing in size only. Fascicles 5–10-flowered. Flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.—*Hook. Ic. Plant. t. 565, 566; Kirk, Forest Fl. t. 53. (H. Sinclairii, Hook. f. Handb. 31, appears to be a form of this with broader more coriaceous obtusely serrate leaves and 2–3-flowered fascicles.)*

NORTH ISLAND: North Cape to the Waikato River, abundant. March–May.

Var. *b*, **lanceolata**, *Hook. f. Fl. Nov. Zel. i. 30.*—Leaves of mature trees coriaceous, ovate-lanceolate oblong-lanceolate or lanceolate, acute or acuminate, sharply toothed, 2–4 in. long; of young plants smaller, thinner, ovate or rounded-ovate, deeply and irregularly lobed and cut. Flowers smaller and fewer.—*Kirk, Forest Fl. tt. 54 f. 2, 54A f. 1, 2, 55 f. A. H. sexstylosa, Col. in Trans. N.Z. Inst. xvii. (1885) 238. (Var. cratægifolia, Hook. f., is based upon the leaves of young trees.)*

NORTH AND SOUTH ISLANDS: Bay of Islands to Canterbury, but local north of the Waikato River. February–April.

Var. *c*, **angustifolia**, *Hook. f. Fl. Nov. Zel. i. 30.*—Leaves of mature trees smaller, 1–2 in., rarely 1–3 in., membranous, oblong or linear-oblong, obtuse or acute, spinulose-toothed. Flowers smaller; fascicles 2–4-flowered. Leaves of young plants small, suborbicular or obovate-orbicular, 3–5-toothed at the tip, cuneate at the base.—*Kirk, Forest Fl. tt. 54 f. 1, 54A f. 3, 54B f. 2, 55 f. 1, 2. H. angustifolia, Raoul, Choix de Plantes, 48, t. 26. Mr. Kirk's subspecies obtusifolia connects this with the previous variety.*

NORTH AND SOUTH ISLANDS: Hawke's Bay to Southland, not uncommon, ascending to 1500 ft. December–February.

An excellent account of the remarkable tendency to variation exhibited by this almost protean species will be found in Kirk's "Forest Flora." The Maoris apply the names *hoihere* or *houhere* to varieties *a* and *b* indifferently; the European settlers usually call all the forms "ribbon-wood" or "lacebark," names which are, unfortunately, also used for *Plagianthus betulinus* and *Gaya Lyallii*.

3. GAYA, H. B. K.

Herbs or shrubs, rarely small trees, usually tomentose with stellate hairs. Flowers pedunculate, axillary or terminal. Bracteoles wanting. Calyx 5-fid. Staminal column split at the apex into numerous filaments. Ovary many-celled; style-branches as many as the cells, filiform; stigmas capitate or truncate; ovules solitary in each cell. Mature carpels membranous, connivent at the apex, separable from the axis, 2-valved at the back and leaving a free

appendage within which arises from the base of the carpel and partly surrounds the seed. Seed pendulous or horizontal.

Species 8-12, all South American except the present one, which is endemic in New Zealand.

1. *G. Lyallii*, *J. E. Baker in Journ. Bot.* xxx. (1892) 137.—A small graceful spreading tree 15-30 ft. in height; young branches, leaves, petioles, and inflorescence more or less covered with stellate pubescence. Leaves on slender petioles 1-2 in. long; blade 2-4 in., ovate, acuminate, usually deeply doubly crenate, sometimes shortly lobed and crenate, cordate and truncate at the base, membranous. Flowers abundantly produced, large, $\frac{3}{4}$ -1 in. diam., white, in axillary fascicles of 3-5, rarely solitary; peduncles slender, 1-2 in., ebracteolate. Calyx broadly campanulate, 5-lobed; lobes triangular. Petals obliquely obovate, retuse towards the apex. Staminal column short, swollen at the base; filaments numerous, long, filiform. Ovary 10-15-celled; styles long, slender, filiform, free to below the middle; stigmas obliquely capitate. Fruit $\frac{1}{2}$ in. diam., globose, slightly depressed, of about 12 much-flattened membranous reniform carpels. Carpels not winged, 2-valved, 1-seeded. Seed much compressed.—*Kirk, Students' Fl.* 72. *Hoheria Lyallii*, *Hook. f. Fl. Nov. Zel.* i. 31, t. 11. *Plagianthus Lyallii*, *Asa Gray ex Hook. f. l.c.* ii. 326; *Hook. f. Handb. N.Z. Fl.* 30; *Bot. Mag.* t. 5935; *Kirk, Forest Fl.* t. 134. *Sida Lyallii*, *F. Muell. Veg. Chath. Is.* 11.

SOUTH ISLAND: Subalpine forests from Nelson to Otago, most plentiful on the western side. Ascends to 3500 ft. *Lacebark.* December-January.

One of the most beautiful trees of the New Zealand flora, often forming a broad fringe to the subalpine beech forests. It is partly deciduous at high elevations, but is certainly evergreen in the river-valleys of Westland and Nelson, where it is very abundant. There are apparently two forms of flowers, one with long styles almost equalling the stamens, another with styles less than half their length.

4. **HIBISCUS**, Linn.

Herbs, shrubs, or trees; glabrous, tomentose, or hispid, the hairs usually stellate. Leaves very various, often more or less palmately lobed. Flowers large and showy. Bracteoles numerous, rarely few, usually narrow, free or connate at the base. Calyx 5-toothed or 5-fid, valvate. Petals 5, adnate at the base to the staminal column. Staminal column truncate or 5-toothed at the summit; filaments many, inserted on the sides of the column; anthers reniform. Ovary 5-celled; ovules 3 or more in each cell; styles 5, spreading; stigmas capitate. Capsule loculicidally 5-valved. Seeds glabrous hairy or woolly.

A large and beautiful genus, abundant in the tropical regions of both hemispheres, a few species only extending into the north or south temperate zones. Both the New Zealand species have a wide distribution outside the colony.

Annual or biennial, 1-2 ft. Leaves deeply lobed. Flowers axillary 1. *H. trionum*.
 Perennial, 3-6 ft.; stem prickly. Leaves broad, lobes shallow. Flowers in terminal racemes 2. *H. diversifolius*.

1. *H. trionum*, Linn. *Sp. Plant.* 697.—A simple or branched annual or biennial 1-2 ft. high, scabrous-pubescent or hispid; branches erect or spreading. Leaves very variable, 1-3 in. long, lower orbicular-cordate with 3-5 shallow lobes, middle and upper deeply 3-5-lobed or -partite; segments oblong or lanceolate, coarsely toothed or incised. Flowers on short axillary peduncles, large, 1-1½ in. diam., pale-yellow with a dark-brown centre. Bracteoles 7-12, narrow-linear, hispid. Calyx membranous, inflated, with numerous raised hispid veins, shortly 5-lobed. Capsule ovoid-globose, hirsute, enclosed in the bladdery calyx. Seeds glabrous.—*Bot. Mag.* t. 209; *Hook. f. Fl. Nov. Zel.* i. 28; *Handb. N.Z. Fl.* 31; *Benth. Fl. Austral.* i. 210; *Kirk, Students' Fl.* 73. *H. vesicarius*, Cav. *Diss.* iii. 171, t. 64, f. 2; *A. Cunn. Precur.* n. 607; *Raoul, Choix de Plantes*, 48.

NORTH ISLAND: Sheltered places near the sea, from the North Cape to the Auckland Isthmus, rare and local. Hicks Bay, East Cape, *Bishop Williams*!
 SOUTH ISLAND: South Wanganui, *Lyall*. In most tropical countries outside America.

2. *H. diversifolius*, *Jacq. Ic. Plant. Rar.* t. 551.—A tall stout and rigid perennial 3-6 ft. high, often woody at the base; branches, petioles, and nerves of the leaves covered with short conical prickles. Leaves on stout petioles 2-3 in. long; blade 2-4 in., broadly cordate or nearly orbicular, irregularly toothed, angular or slightly 3-5-lobed, scabrous. Flowers in terminal racemes, large, handsome, 2-3 in. diam., pale-yellow with a dark centre. Pedicels short; bracts lanceolate or 3-fid. Bracteoles 10, linear. Calyx-lobes lanceolate, bristly. Capsule ovoid, acuminate, densely hispid.—*Benth. Fl. Austral.* i. 213; *Kirk in Trans. N.Z. Inst.* iii. (1871) 163; *Students' Fl.* 73.

NORTH ISLAND: Moist sandy places near the sea, from the North Cape to Hokianga and the Bay of Islands, rare, *Colenso, Kirk*! *R. H. Matthews*! *T. F. C.* Also in Australia, the Pacific islands, tropical Africa, &c.

Both this and the preceding species are being rapidly destroyed by cattle, fires, &c., and are now rare or almost extinct in localities where they were plentiful twenty or thirty years ago.

ORDER XI. TILIACEÆ.

Trees or shrubs, rarely herbs. Leaves alternate, seldom opposite, simple, entire or toothed or lobed. Stipules usually present, often caducous. Flowers regular, hermaphrodite or unisexual, axillary or terminal, usually cymose. Sepals 3-5, free or connate, generally valvate. Petals the same number as the sepals or fewer, rarely wanting, imbricate or valvate, entire cut or multifid.

Stamens numerous, rarely few, usually inserted on the torus, which is often elevated and disc-like; anthers 2-celled. Ovary free, 2-10-celled; style simple or divided into as many lobes or stigmas as there are cells to the ovary; ovules few or many, attached to the inner angle of the cell. Fruit dry or fleshy, dehiscent or indehiscent, 2-10-celled, or by abortion 1-celled. Seeds solitary or many; albumen usually copious, fleshy; embryo straight or seldom curved, radicle next the hilum.

An order comprising about 45 genera and 350 species, chiefly tropical and subtropical. One genus (*Tilia*) is found in the north temperate zone; and several are endemic in southern latitudes or extend thereto. The most important economic plant is *Corchorus capsularis*, which yields the fibre known as jute. All the species are innocuous. Of the three New Zealand genera, *Entelea* is endemic; *Aristotelia* extends to Australia, Tasmania, and temperate South America; while *Elæocarpus* is mainly Indian and Malayan, stretching southwards to Australia, New Zealand, and the Pacific islands.

Leaves large, alternate. Capsule clothed with rigid

bristles .. .. .	.. .. .	1. ENTELEA.
Leaves opposite. Fruit a berry .. .. .	.. .. .	2. ARISTOTELIA.
Leaves alternate. Fruit a drupe .. .. .	.. .. .	3. ELÆOCARPUS.

1. ENTELEA, R. Br.

A shrub or small tree. Leaves large, alternate, cordate, 5-7-nerved, toothed or crenate. Flowers in terminal umbelliform cymes, large, white, bracteate. Sepals 4-5, free. Petals the same number, crumpled. Stamens numerous, all fertile, free; anthers versatile. Ovary 4-6-celled; style simple; stigma terminal, denticulate or fringed; ovules numerous in each cell. Capsule globose, covered with long rigid bristles, loculicidally 4-6-valved. Seeds numerous, obovoid; testa coriaceous; albumen oily.

The genus consists of a single endemic species. It is very closely allied to the South African *Sparmannia*.

1. *E. arborescens*, R. Br. in *Bot. Mag.* t. 2480.—A handsome shrub or small tree 8-20 ft. high, with a trunk 5-9 in. diam.; wood exceedingly light. Young branches, leaves, petioles, and inflorescence covered with short soft stellate hairs. Leaves alternate, large, on petioles 4-8 in. long; blade 4-9 in. or more, obliquely rounded-ovate, cordate at the base, acuminate, irregularly doubly crenate-serrate, often obscurely 3-lobed, 5-7-nerved from the base; stipules persistent. Flowers very abundant, in erect terminal or axillary cymes, white, 1 in. diam. Sepals acuminate. Ovary hispid. Capsule 1 in. diam., globose, echinate with long rigid bristles.—*A. Cunn. Precur.* n. 601; *Raoul, Choix de Plantes*, 48; *Hook. f. Fl. Nov. Zel.* i. 31; *Handb. N.Z. Fl.* 32; *Kirk, Forest Fl.* t. 33; *Students' Fl.* 74. *Apeiba australis*, *A. Rich. Fl. Nouv. Zel.* 301, t. 34.

NORTH ISLAND: Not uncommon along the shores from the Three Kings and the North Cape to Tairua and Raglan, rare and local further south. East Cape

district, *Banks and Solander!* *J. Adams*; Hawke's Bay, *Colenso!* Cape Pal-
liser and Paikakariki, *Kirk*; Urenui, Taranaki, *T. F. C.* SOUTH ISLAND:
Collingwood, *Hector*; islands near Cape Farewell, *Kingsley*. *Whau, Hauma.*
October-January.

Greedily eaten by cattle and horses, and consequently fast becoming rare on
the mainland, except in comparatively inaccessible situations. It is still plenti-
ful on most of the small outlying islands on the north-east coast of the Auckland
District, often exhibiting great luxuriance. On Cuvier Island I measured leaves
with petioles 2 ft. long, with a blade 1 ft. 6 in. diam. The wood is extremely
light, the specific gravity being much less than that of cork. It is frequently
used by the Maoris for the floats of fishing-nets.

2. *ARISTOTELIA*, L'Herit.

Shrubs or trees. Leaves opposite or nearly so, entire or
toothed, exstipulate. Flowers small, unisexual, axillary or lateral,
racemose or rarely solitary. Sepals 4-5, valvate. Petals the same
number, 3-lobed, toothed or entire, inserted round the base of the
thickened torus. Stamens numerous or 4-5, inserted on the torus.
Ovary 2-4-celled; ovules 2 in each cell; styles subulate. Fruit a
berry. Seeds ascending or pendulous, often pulpy on the outside
of the hard testa.

A small genus of 9 species, 3 of which are found in Australia, 1 in the New
Hebrides, 2 in South America, and the 3 following in New Zealand.

- | | |
|--|--------------------------|
| Leaves large, membranous. Racemes paniced, many-
flowered | 1. <i>A. racemosa</i> . |
| Leaves large, not so membranous as the preceding. | |
| Racemes simple or only slightly compound | 2. <i>A. Colensoi</i> . |
| Leaves small, coriaceous. Flowers few together or solitary | 3. <i>A. fruticosa</i> . |

1. *A. racemosa*, *Hook. f. Fl. Nov. Zel.* i. 33.—A small graceful
tree 8-25 ft. high; bark of young branches red, becoming darker
with age; branchlets, young leaves, petioles, and inflorescence
pubescent. Leaves opposite or nearly so, 2-5 in. long, ovate or
ovate-cordate, acuminate, thin and membranous, deeply and
irregularly acutely serrate, often reddish beneath; petioles long and
slender. Flowers small, $\frac{1}{6}$ in. diam., rose-coloured, in many-
flowered axillary panicles, diœcious; the males rather larger than
the females; pedicels slender. Petals 4, 3-lobed at the tip, smaller
in the female flowers. Stamens numerous, minutely hairy; anthers
longer than the filaments. Female flowers: Ovary 3-4-celled;
styles the same number. Fruit a 3-4-celled berry about the size of
a pea, dark-red or almost black. Seeds usually about 8, angular.—
Handb. N.Z. Fl. 33; *T. Kirk, Forest Fl.* t. 113; *Students' Fl.* 75.
Friesia racemosa, *A. Cunn. Precur.* n. 603; *Raoul, Choix de Plantes*,
48; *Hook. Ic. Plant.* t. 601.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common in lowland forests
throughout, ascending to nearly 2000 ft. *Makomako*, wineberry. Sep-
tember-November.

An abundant and well-known plant, usually the first to appear after the
forest has been cut down. The wood is largely employed for making charcoal
for the manufacture of gunpowder.

2. *A. Colensoi*, Hook. f. *Handb. N.Z. Fl.* 33.—A shrub or small tree 6–15 ft. high, very similar in general appearance to *A. racemosa*, but the leaves are firmer in texture, sometimes narrower and ovate-lanceolate, usually quite glabrous, green below. Racemes simple, rarely compound, few-flowered. Berry smaller, the size of a peppercorn.—*Kirk, Students' Fl.* 75.

NORTH ISLAND: Wairarapa Valley, *Colenso*! SOUTH ISLAND: Subalpine forests from Nelson to Otago, apparently not common.

A puzzling plant. There is an unnamed specimen of old date in Mr. Colenso's herbarium which agrees perfectly with Hooker's description; but all the South Island specimens that I have seen have broader and less acuminate leaves. Probably all are nothing more than forms of *A. racemosa*.

3. *A. fruticosa*, Hook. f. *Fl. Nov. Zel.* i. 34.—A very variable much-branched erect or decumbent shrub 3–8 ft. high; branches often close and rigid; bark red-brown; branchlets, petioles, and pedicels pubescent. Leaves excessively variable, of young plants linear or lanceolate, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, acute or acuminate, toothed lobed or pinnatifid; on mature plants $\frac{1}{4}$ –1 in. long, ovate-obovate or oblong-obovate or linear-oblong, obtuse, coriaceous, entire crenate serrate or shortly lobed; petioles short, stout. Flowers small, axillary, solitary or in 3–6-flowered racemes or cymes; pedicels short, pubescent. Sepals 4, oblong, obtuse, pubescent. Petals 4, shorter or longer than the sepals, entire or with 1–4 irregular shallow notches at the apex. Stamens 4–6; filaments very short. Berry very small, globose. Seeds usually 4.—*Handb. N.Z. Fl.* 33; *Kirk, Students' Fl.* 75. *A. erecta*, Buch. in *Trans. N.Z. Inst.* iii. (1871) 209. *Myrsine brachyclada*, Col. in *Trans. N.Z. Inst.* xxii. (1890) 478.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Mountainous districts from the Thames southwards, but rare north of the East Cape. Ascends to 4000 ft.

One of the most variable plants in New Zealand. There seem to be two well-marked forms—one with an erect and comparatively open habit of growth, larger leaves, and 4–6-flowered racemes, answering to the *A. erecta* of Buchanan; the other is often decumbent, with rigid and interlaced often tortuous branches, smaller leaves, and frequently solitary flowers.

3 ELÆOCARPUS, Linn.

Trees. Leaves usually alternate, entire or serrate, exstipulate. Flowers hermaphrodite, rarely polygamous, in axillary racemes. Sepals 4 or 5, distinct, valvate. Petals the same number, lacinate at the apex, inserted round a cushion-shaped torus. Stamens numerous, seated on the torus; anthers long, awned, opening by a terminal slit. Ovary 2–5-celled; ovules 2 or more in each cell, pendulous; style subulate; stigma terminal, simple. Fruit a drupe with a hard or bony stone, which is 2–5-celled or by abortion 1-celled. Seeds solitary in each cell, pendulous; albumen fleshy; cotyledons broad.

A large genus, containing about 60 species. Most plentiful in the hotter parts of India and the Malay Archipelago, a few species only extending to Australia, the Pacific islands, and New Zealand. Both our species are endemic.

Branchlets silky. Leaves linear-obovate, margins re-	
curved	1. <i>E. dentatus</i> .
Branchlets glabrous. Leaves linear-oblong or lanceolate,	
margins flat	2. <i>E. Hookerianus</i> .

1. *E. dentatus*, Vahl. *Symb. Bot.* iii. 66.—A round-headed tree 40–60 ft. in height; trunk slender, straight, 1–3 ft. diam.; branchlets often bare of leaves except at the tips, silky when young. Leaves erect, on short stout petioles $\frac{1}{2}$ –1 in. long; blade 2–4 in., linear-oblong obovate-oblong or obovate-lanceolate, narrowed below, obtuse or shortly acuminate, coriaceous, obscurely sinuate-serrate, often white with fine appressed silky hairs beneath; margins recurved. Racemes numerous, 8–12-flowered, silky, usually shorter than the leaves. Flowers drooping, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., white. Petals obovate-cuneate, lacerate. Stamens 10–20; filaments very short; anthers linear, with a flat recurved tip. Ovary silky, 2-celled. Drupe about $\frac{1}{2}$ in. long, oblong or ovoid, purplish-grey; stone rugose, 1-celled, 1-seeded.—*Hook. f. Handb. N.Z. Fl.* 34; *T. Kirk, Forest Fl.* t. 11; *Students' Fl.* 76. *E. Hinau*, A. Cunn. *Precur.* n. 602; *Hook. Ic. Plant.* t. 602; *Hook. f. Fl. Nov. Zel.* i. 32. *E. Cunninghamii*, Raoul, *Choix de Plantes*, 25. *Dicera dentata* et *D. serrata*, Forst. *Char. Gen.* 80. *Eriostemon dentatus*, Colla. *Hort. Ripul.* 52, t. 30.

NORTH AND SOUTH ISLANDS: Not uncommon in lowland forests from the North Cape to Catlin's River, Otago. Altitudinal range from sea-level to 2000 ft. *Hinau*. October–November.

The fruit was formerly eaten by the Maoris, the pulpy part being rubbed off the stone, steeped in water, and then made into large cakes, which were baked for a day or two. They also obtained a black dye from the bark, which was used for dyeing their flax cloaks, and is still employed for that purpose by a few of the inland tribes. The wood is durable, but is little employed, although a figured variety is now coming into use for panelling and furniture.

2. *E. Hookerianus*, Raoul, *Choix de Plantes*, 26, t. 25.—A small glabrous tree 20–40 ft. high, with a trunk 1–3 ft. diam.; bark pale. Young plants with numerous tortuous and interlaced branches, which bear narrow-linear leaves $\frac{1}{2}$ –2 in. long, sinuate or irregularly toothed or lobed or almost pinnatifid, occasionally broadly obovate or almost orbicular. Leaves of mature plants $1\frac{1}{2}$ –3 in. long, elliptical or linear-oblong or lanceolate, coriaceous, obtuse, sinuate-crenate or serrate; margins flat; petioles short, $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Racemes slender, spreading, shorter than the leaves. Flowers greenish-white, small, drooping. Sepals lanceolate. Petals slightly longer than the sepals, 4–5-lobed at the tip. Drupe similar to that of *E. dentatus*, but smaller, $\frac{1}{3}$ in. long.—*Hook. f. Fl. Nov. Zel.* i. 32; *Handb. N.Z. Fl.* 34; *T. Kirk, Forest Fl.* t. 12, 13; *Students' Fl.* 76.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Forests from Mongonui and Kaitaia southwards, but exceedingly local north of the Auckland Isthmus. Altitudinal range from sea-level to 3000 ft. *Pokaka*. November-January.

The variability of the leaves in young plants is most remarkable. As the young tree grows up it is not uncommon to find on the lower branches a curious mixture of linear, obovate, or almost orbicular leaves, which may be nearly entire or deeply lobulate; while on the upper branches the leaves have already assumed the shape of the mature stage.

ORDER XII. LINEÆ.

Herbs or shrubs, rarely trees. Leaves alternate, simple, usually entire; stipules present or wanting. Flowers regular, hermaphrodite. Sepals 5, rarely 4, free or coherent at the base, imbricate. Petals the same number, hypogynous or slightly perigynous, imbricate, often contorted. Stamens as many as the petals or twice as many, rarely more; filaments united below into a ring which frequently has 5 small glands at the base; anthers 2-celled, versatile. Ovary free, entire, 3-5-celled; styles the same number, distinct or more or less united; ovules 1-2 in each cell, pendulous, anatropous. Fruit either a capsule splitting into 3-5 cocci, or more rarely a drupe. Seeds 1-2 in each cell; albumen fleshy or wanting; embryo usually straight, radicle superior.

A small order, scattered over the whole world, the herbaceous species mainly temperate, the shrubby almost all tropical. Genera 14; species about 140. The common flax, *Linum usitatissimum*, so valuable from the tenacity of its fibre and its oily seeds, is the most important member of the order. The Peruvian *Erythroxylon coca* yields the important drug cocaine, and the leaves are chewed as a stimulant. The only New Zealand genus is widely distributed.

1. LINUM, Linn.

Herbs, rarely shrubby at the base. Leaves usually alternate, narrow, quite entire; stipules generally wanting. Flowers in panicle or racemose or fascicled cymes. Sepals 5, entire. Petals 5, contorted in æstivation, fugacious. Stamens 5, alternate with the petals, hypogynous, usually connate at the base, often alternating with 5 minute staminodia. Disc of 5 glands opposite to the petals and adnate to the staminal ring. Ovary 5-celled, with 2 ovules in each cell; cells sometimes divided into 2; styles 5. Capsule 5-celled, septicidally splitting into 5 2-seeded or 10 1-seeded cocci. Seeds compressed, albumen scanty.

A genus of 80 species or more, mostly natives of temperate or subtropical climates. The single indigenous species is endemic.

(The Australian *L. marginale*, A. Cunn., is now plentifully naturalised in many parts of New Zealand, especially to the north of Taranaki and Hawke's Bay. It can be distinguished from *L. monogynum* by its smaller size, more slender habit, and small pale-blue flowers.)

1. *L. monogynum*, Forst. Prodr. n. 145.—A very variable perfectly glabrous perennial herb, sometimes woody at the base;

stems few or many, simple or branched, erect or spreading, 6–24 in. high. Leaves numerous, scattered, ascending, $\frac{1}{4}$ –1 in. long, linear-oblong to linear-lanceolate or linear-subulate, 1–3-nerved. Flowers in terminal corymbs, white, often large and handsome, sometimes 1 in. diam. Sepals ovate or ovate-lanceolate, acute. Styles united at the base, their tips free, recurved. Capsule large, broadly ovoid, splitting into 10 1-seeded cocci.—*A. Rich. Fl. Nouv. Zel.* 317; *A. Cunn. Precur. n.* 608; *Hook. Bot. Mag. t.* 3574; *Raoul, Choix de Plantes*, 47; *Hook. f. Fl. Nov. Zel. i.* 28; *Handb. N.Z. Fl.* 35; *Kirk, Students' Fl.* 77.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant along the coasts, and occasionally found inland, ascending to almost 2000 ft. on the mountains of the South Island. October–January.

A very beautiful but highly variable plant.

ORDER XIII. GERANIACEÆ.

Herbs or shrubs, very rarely trees. Leaves opposite or alternate, usually stipulate. Flowers regular or irregular, generally hermaphrodite. Sepals 5, seldom fewer, free or united to the middle, imbricate or rarely valvate, posterior one sometimes spurred. Petals as many as the sepals, rarely fewer or wanting, hypogynous or slightly perigynous, usually imbricate. Torus barely expanded into a disc, with or without 5 glands alternating with the petals, usually raised in the centre into a beak. Stamens generally twice the number of the petals or fewer by suppression; filaments free or connate at the base; anthers 2-celled. Ovary 3–5-lobed, cells the same number; carpels 3–5, adnate to the axis as far as the insertion of the ovules, and often prolonged into a beak-like style or styles; ovules 1–2 to each carpel, rarely more. Fruit a 3–5-lobed capsule, often splitting from below upwards into as many 1-seeded carpels with long styles, which coil up elastically; or the capsule may be loculicidally 3–5-celled, with 2–several seeds in each cell; or more rarely the mature fruit is composed of 3–5 indehiscent 1-seeded cocci. Seeds with scanty or no albumen; embryo straight or curved.

A rather large and somewhat heterogeneous order, composed of several tribes differing in important points of structure, and often kept up as separate orders. Taken in a broad sense, it contains 20 genera and about 750 species. Probably about three-quarters of the species are natives of South Africa, but the order is also well represented in the north temperate zone. It is comparatively rare in the tropics and in Australasia. Many of the species are highly ornamental, but few of them possess any economic value. The three New Zealand genera have a wide range.

A. Capsule beaked, splitting into 1-seeded lobes which coil up elastically along the beak. Leaves toothed or lobed.

Flowers regular. Perfect stamens 10 1. GERANIUM.

Flowers irregular, with a spur adnate to the pedicel.

Perfect stamens 5–7 2. PELARGONIUM.

B. Capsule opening loculicidally. Leaves 3-foliolate.

Flowers regular 3. *OXALIS*.

1. *GERANIUM*, Linn.

Annual or perennial herbs, rarely woody at the base. Leaves opposite or alternate, usually palmately lobed or cut, stipulate. Peduncles axillary, bracteate, 1-2-flowered. Flowers regular. Sepals 5. Petals 5, hypogynous, imbricate, alternating with 5 glands. Stamens 10, usually all perfect, rarely 5 without anthers, free or connate at the base. Ovary 5-lobed and 5-celled, with a long beak terminated by 5 stigmas; ovules 2 in each cell, superposed. Capsule splitting from below upwards into 5 carpels with long styles, which roll up elastically; seeds 1 in each carpel.

A well-known genus, comprising over 100 species, widely distributed over the whole world, but most abundant in the Northern Hemisphere. Two of the New Zealand species are endemic; 1 extends to Australia and temperate South America; the remaining 2 are found in most temperate regions.

- | | |
|---|------------------------------|
| Stems suberect. Leaves much divided. Peduncles 2-flowered. Sepals awned. Seeds coarsely reticulated . . | 1. <i>G. dissectum</i> . |
| Stems prostrate. Peduncles 1-flowered. Sepals hardly awned. Seeds smooth or very finely reticulated . . | 2. <i>G. microphyllum</i> |
| Stemless or nearly so. Rootstock stout. Peduncles 1-flowered. Seeds quite smooth | 3. <i>G. sessiliflorum</i> . |
| Stems prostrate, and with the leaves silky-hoary. Peduncles 1-flowered. Flowers large | 4. <i>G. Traversii</i> . |
| Softly pilose. Stems diffuse or prostrate. Peduncles 2-flowered. Sepals mucronate. Carpels wrinkled. Seeds smooth | 5. <i>G. molle</i> . |

1. *G. dissectum*, Linn. *Cent.* i. 21, var. *australe*, Benth. *Fl. Austral.* i. 296.—A branching decumbent or suberect annual or perennial herb, sometimes with a stout swollen rootstock. Stem 1-2 ft. long, often covered with soft spreading or retrorse hairs, rarely almost glabrous. Leaves on long slender petioles; blade 1-2 in. diam. or more, cut to the base or nearly so into 5-7 segments which are again deeply and irregularly divided into few or many usually narrow lobes; lobes obtuse or acute. Peduncles slender, 2-flowered. Flowers very variable in size. Sepals ovate or ovate-lanceolate, usually with an awn of varying length, pilose. Petals as long or longer than the sepals, slightly notched at the apex. Carpels hairy, even. Seeds deeply and coarsely reticulated. —*G. dissectum* var. *carolinianum*, Hook. f. *Fl. Nov. Zel.* i. 39; *Handb. N.Z. Fl.* 36; Kirk, *Students' Fl.* 79.

Var. *a*, *pilosum*, Hook. f. *Handb. N.Z. Fl.* 36.—Suberect or spreading, clothed with spreading hairs. Petals often large.—*G. pilosum*, Forst. *Prodr.* n. 531; A. Cunn. *Precur.* n. 593. *G. patagonicum*, Hook. f. *Fl. Antarct.* ii. 252.

Var. *b*, *patulum*, Hook. f. *l.c.*—Suberect or spreading, clothed with spreading and retrorse hairs. Petals usually small.—*G. patulum*, Forst. *Prodr.* n. 530. *G. retrorsum*, L'Herit, ex D.C. *Prodr.* i. 644; A. Cunn. *Precur.* n. 594.

Var. *c*, *glabratum*, Hook. f. *l.c.*—Stout, procumbent, almost glabrous. Leaves 3-5-lobed; lobes much broader and less cut.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Extends as far south as the Bluff, but most plentiful in the north. Var. *australe* occurs in Australia, Tasmania, and South America; the typical form is abundant in the Northern Hemisphere.

2. *G. microphyllum*, Hook. f. *Fl. Antart.* i. 8, t. 5.—A slender much-branched prostrate and straggling perennial 6–18 in. long, more or less pubescent with appressed silky white hairs, which are sometimes retrorse on the peduncles and pedicels. Leaves on long slender petioles; blade $\frac{1}{2}$ –1 in. diam., orbicular in outline, cut to the middle or below into 3–7 broad or narrow obtuse lobes, which are more or less deeply toothed at the tips; stipules small. Peduncles 1-flowered, rarely 2-flowered; flowers usually white. Sepals ovate-lanceolate, barely awned. Petals longer than the sepals, entire or slightly retuse. Carpels smooth and even, pilose. Seeds longitudinally striated, reticulations long and narrow, not conspicuous.—*Handb. N.Z. Fl.* 36; *Kirk, Students' Fl.* 80. *G. potentilloides*, Hook. f. *Fl. Nov. Zel.* i. 40 (*non L'Herit*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Common from the North Cape southwards, ascending to 3000 ft. Endemic.

This differs from all the forms of *G. dissectum* in the more slender habit, less deeply lobed and smaller leaves, 1-flowered peduncles, paler flowers, and in the much smaller and narrower reticulations on the seeds.

3. *G. sessiliflorum*, Cav. *Diss.* 198, t. 77, f. 2.—A depressed almost stemless perennial, more or less covered with spreading or retrorse silky hairs. Rootstock stout and woody, often branched above. Leaves mostly radical, numerous, crowded, on long slender petioles; blade $\frac{1}{4}$ – $\frac{3}{4}$ in. diam., orbicular, deeply divided into 3–5 toothed or lobed segments; stipules broad, membranous. Flowering-stems very short or quite undeveloped. Peduncles usually 1-flowered, short, seldom equalling the leaves. Flowers small. Sepals oblong, shortly awned, silky. Petals white, exceeding the sepals. Carpels even, minutely hairy. Seeds smooth, not reticulated.—*Hook. f. Handb. N.Z. Fl.* 36; *Benth. Fl. Austral.* i. 297; *T. Kirk, Students' Fl.* 80. *G. brevicaulis*, Hook. in *Journ. Bot.* i. (1834) 252; *Hook. f. Fl. Nov. Zel.* i. 40.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the Lower Waikato southwards, ascending to 3000 ft. Also in Victoria, Tasmania, and temperate South America.

Easily distinguished from all the other species by the small size, stemless habit, and even seeds.

4. *G. Traversii*, Hook. f. *Handb. N.Z. Fl.* 726.—A perennial herb, more or less hoary in all its parts with short and dense silvery white hairs; stems decumbent or prostrate, 1–2 ft. long. Radical leaves on long slender petioles 4–9 in. long; blade 1–3 in. diam., orbicular in outline, 5–7-lobed to the middle; lobes cuneate, toothed or lobed at the tips, silky-hoary on both surfaces. Cauline leaves much smaller and on much shorter petioles. Stipules broadly

ovate, cuspidate. Peduncles 1-4 in. long, 1-flowered, with 2 acuminate bracts about the middle. Flowers large, $\frac{3}{4}$ -1 in. diam., white or pink. Sepals broadly ovate, cuspidate. Petals broad-obovate, entire, much longer than the sepals. Carpels silky-pilose. Seeds very minutely reticulated.—*T. Kirk, Students' Fl.* 80; *Buch. in Trans. N.Z. Inst.* vii. t. 13, f. 2.

CHATHAM ISLANDS: Not uncommon in open places, *H. H. Travers!* *J. D. Enys!* November-December.

By far the finest of the New Zealand species. Well characterized by the silvery hoary pubescence, 1-flowered peduncles, large flowers, and minutely reticulated seeds.

5. **G. molle**, *Linn. Sp.* 682.—A diffuse or procumbent much-branched annual or perennial, more or less softly pilose in all its parts; stems 6-12 in. long. Radical leaves numerous, on long slender petioles; blade orbicular, 1-2 in. diam., 5-9-lobed to below the middle; lobes obovate or cuneate, irregularly lobed or crenate. Cauline leaves smaller, on shorter petioles, with fewer but deeper divisions. Peduncles shorter than the leaves, 2-flowered. Flowers small, purplish. Sepals broadly ovate, mucronate. Petals deeply notched, barely exceeding the sepals. Carpels usually distinctly marked with transverse wrinkles. Seeds smooth, not reticulated.—*Hook. f. Fl. Nov. Zel.* i. 40; *Handb. N.Z. Fl.* 37; *T. Kirk, Students' Fl.* 81.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS.—Abundant throughout, ascending to over 2500 ft. in the South Island. Common in Europe, north Africa, and western Asia; and naturalised in other countries.

There can be little doubt that this is introduced, but as it has had a place given to it in previous works on New Zealand plants, and as it is now found in all soils and situations, and would certainly be considered indigenous by a stranger unacquainted with its history, it appears best to retain it in the Flora.

2. **PELARGONIUM**, L'Herit.

Herbs or shrubs. Leaves opposite or rarely alternate, entire toothed lobed or variously divided. Flowers usually in few- or many-flowered umbels on axillary peduncles, irregular. Sepals 5, the uppermost produced into a short spur adnate to the pedicel. Petals 5 or fewer by abortion, the 2 upper different from the others and usually larger. Disc without glands. Stamens 10, hypogynous, connate at the base, 5-7 (rarely fewer) fertile, the remainder without anthers or rudimentary. Ovary 5-lobed, 5-celled, beaked; beak terminated by 5 short styles, which are longitudinally stigmatose; ovules 2 in each cell. Capsule splitting into 5 carpels with long styles, which roll up elastically; seeds 1 in each carpel.

Species about 180, the whole of which are natives of South Africa except 3 found in North Africa and the Levant, and 2 in Australia and New Zealand.

1. **P. australe**, *Jacq. Eclog. t. 100.*—A decumbent or erect simple or branched more or less hairy herb 6–18 in. high; root-stock stout. Leaves on slender petioles 2–6 in. long; blade 1–2 in. diam., ovate-cordate or orbicular-cordate, obscurely 3–5-lobed; lobes finely crenate-serrate, obtuse; stipules broad. Peduncles longer than the leaves; umbels 10–12-flowered. Flowers small, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., pink. Sepals ovate, acute, hairy; spur usually very short. Petals from $\frac{1}{3}$ to $\frac{1}{2}$ as long again as the sepals, spathulate, notched. Fertile stamens 5, the remainder reduced to membranous scale-like staminodia. Carpels very hairy, their beaks long, lined on the inner face with long soft white hairs.—*Benth. Fl. Austral. i. 298*; *Kirk, Students' Fl. 82*. *P. australe var. clandestinum*, *Hook. f. Handb. N.Z. Fl. 37*. *P. clandestinum*, *L'Herit ex D.C. Prodr. i. 160*; *A. Cunn. Precur. n. 595*; *Raoul, Choix, 47*; *Hook. f. Fl. Nov. Zel. i. 41*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 2000 ft. *Kopata*. November–February.

Also found in Australia and Tasmania, and in Tristan d'Acunha, and probably identical with the South African *P. grossularioides*, Ait.

3. **OXALIS**, Linn.

Herbs, stemless or caulescent. Leaves all radical or alternate, compound, usually 3-foliolate, stipulate or exstipulate. Flowers regular, on axillary 1- or more-flowered peduncles. Sepals 5, imbricate. Petals 5, hypogynous, contorted. Disc without glands. Stamens 10, free or connate at the base, all anther-bearing. Ovary 5-lobed, 5-celled; styles 5, distinct; ovules 1 or more in each cell. Capsule loculicidally dehiscent, the valves persistent on the axis. Seeds with an outer fleshy coat which bursts elastically; testa crustaceous; albumen fleshy.

A large genus of over 200 species, chiefly found in South America and South Africa, with a few widely dispersed in most parts of the world.

Stem elongated. Peduncles axillary, 1–6-flowered. Flowers

yellow 1. *O. corniculata*.

Stem short or wanting. Peduncles radical, 1-flowered.

Flowers white 2. *O. magellanica*.

1. **O. corniculata**, *Linn. Sp. Plant. 435.*—A prostrate, decumbent or ascending, glabrous or pubescent, much-branched perennial 2–12 in. long; stems often matted. Leaves alternate, on long or short petioles, 3-foliolate; leaflets broadly obcordate, very variable in size, $\frac{1}{8}$ –1 in. long, glaucous beneath. Stipules minute, adnate to the petiole or wanting. Peduncles axillary, 1–6-flowered, about as long as the petioles. Flowers yellow, variable in size. Sepals acute or obtuse. Petals obcordate, notched. Capsule oblong or linear, subcylindric; seeds few or many in each cell.—*Hook. f. Fl. Nov. Zel. i. 42*; *Handb. N.Z. Fl. 38*; *Benth. Fl. Austral. i. 301*; *Kirk, Students' Fl. 83*.

Var. *a*.—Decumbent. Leaves stipulate. Capsules $\frac{1}{2}$ –1 in. long, downy.

Var. *b*, ***stricta***, Hook. f. *Fl. Nov. Zel.* i. 42.—Erect or suberect. Stipules wanting. Flowers small. Capsules large.—*O. stricta*, Linn. *Sp. Plant.* 435. *O. Urvillei*, propinqua, divergens, laticola, A. Cunn. *Precur.* n. 584, 586, 588, 590.

Var. *c*, ***microphylla***, Hook. f. *l.c.*—Stems procumbent, slender, rooting. Leaflets usually minute. Capsule oblong.—*O. exilis*, A. Cunn. *l.c.* n. 587.

Var. *d*, ***ciliifera***, Hook. f. *l.c.*—Stems procumbent, filiform, matted. Leaflets membranous, ciliated.—*O. tenuicaulis* and *O. ciliifera*, A. Cunn. *l.c.* n. 589, 591.

Var. *e*, ***crassifolia***, Hook. f. *l.c.*—Stems rigid, matted. Leaflets small, thick, pilose.—*O. crassifolia*, A. Cunn. *l.c.* n. 592.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant throughout, chiefly in lowland situations.

One of the most widely diffused and variable plants known, found in almost all temperate and tropical countries.

2. ***O. magellanica***, Forst. in *Comm. Gotting.* ix. (1789) 33.—A small glabrous or pubescent almost stemless herb 2–4 in. high; rootstock creeping, scaly. Leaves all radical, on long slender hairy petioles, trifoliate; leaflets obcordate, glabrous, glaucous beneath. Peduncles radical, long and slender, often exceeding the leaves, 2-bracteolate above the middle, 1-flowered. Flowers rather large, pure white, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. Sepals small, ovate, obtuse. Petals obovate or obcordate, often oblique. Capsule globose.—Hook. f. *Fl. Antarct.* ii. 253; *Fl. Nov. Zel.* i. 42, t. 13; *Handb. N.Z. Fl.* 38; *Benth. Fl. Austral.* i. 300; *Kirk, Students' Fl.* 84. *O. cataractæ*, A. Cunn. *Precur.* n. 585; *Hook. Ic. Plant.* t. 418; *Raoul, Choix*, 47.

NORTH AND SOUTH ISLANDS: From Mongonui and Kaitaia southwards, in damp and shaded or subalpine localities. Sea-level to fully 4000 ft. Also in Australia, Tasmania, Chili, and Fuegia, and closely allied to the common *O. acetosella* of the Northern Hemisphere.

ORDER XIV. RUTACEÆ.

Trees or shrubs, very rarely herbs, plentifully supplied with pellucid glands filled with an aromatic or pungent essential oil. Leaves opposite or alternate, simple or compound, exstipulate. Flowers regular, hermaphrodite or rarely unisexual. Calyx 4–5-lobed or divided into as many free sepals, imbricate. Petals the same number, hypogynous or slightly perigynous, imbricate or valvate. Stamens usually free, hypogynous, as many or twice as many as the petals, rarely more numerous; anthers 2-celled, versatile. Disc placed between the stamens and ovary, usually annular, entire or lobed or crenate. Ovary of 4–5 free or connate carpels; styles as many, free at the base, united above; ovules usually 2 in each carpel. Fruit very various, sometimes of 4–5 2-valved cocci, or a berry or drupe, rarely a capsule with loculicidal dehiscence. Seeds generally solitary in each cell; albumen fleshy or wanting; embryo large, straight or curved, radicle superior.

As defined by Hooker and Benthham in the "Genera Plantarum," this is a large and heteromorphous order, comprising between 80 and 90 genera and nearly 700 species. Most of the species are either tropical or inhabit South Africa or Australia. They are comparatively rare in the north temperate zone. The chief characteristic of the order is the presence of an essential oil, which is usually abundant in the leaves and young growing parts, often giving them an aromatic odour and bitter or pungent taste. The orange, lemon, citron, lime, &c., are the chief economic species. The two New Zealand genera are also found in Australia, and *Melicope* extends into the Pacific islands as well.

Leaves simple, petiole terete. Flowers 5-merous .. 1. PHEBALIUM.
 Leaves compound, or if simple with the petioles winged.
 Flowers 4-merous 2. MELICOPE.

1. PHEBALIUM, Vent.

Shrubs. Leaves alternate, simple, entire or slightly toothed, pellucid-dotted. Flowers usually in axillary or terminal corymbs, rarely solitary. Calyx small, 5-lobed or-partite. Petals 5, imbricate or valvate. Stamens 8-10, longer or shorter than the petals; filaments filiform, glabrous. Ovary 2-5-partite almost to the base; style simple; stigma small, capitellate; ovules 2 in each cell, superposed. Cocci 2-5, truncate or rostrate; endocarp cartilaginous and separating elastically. Seeds usually solitary.

A genus of 28 species, all of which are confined to Australia with the exception of the present one, which is endemic in New Zealand.

1. *P. nudum*, Hook. Ic. Plant. t. 568.—A graceful much-branched perfectly glabrous shrub 4-12 ft. high; branchlets slender, with reddish bark. Leaves alternate, 1-1½ in. long, linear-oblong or narrow oblong-lanceolate, coriaceous, obtuse, obscurely crenate, narrowed into short petioles or almost sessile, pellucid-dotted. Flowers ½ in. diam., white, fragrant, in terminal many-flowered corymbs; pedicels short, scurfy. Calyx very small, with 5 broad lobes. Petals 5, lanceolate or linear, obtuse; margins involute. Stamens much longer than the petals. Cocci 1-4, but usually only 1 or 2 ripen, obtusely rhomboid, wrinkled, splitting into 2 valves.—*Raoul*, *Choix*, 48; *Hook. f. Fl. Nov. Zel.* i. 44; *Handb. N.Z. Fl.* 39; *Kirk, Students' Fl.* 85.

NORTH ISLAND: Hilly forests from Kaitia southwards to the Thames River, ascending to 2500 ft. *Mairehau*. October-December.

Highly aromatic in all its parts. The flowers have been used for the extraction of a perfume.

2. MELICOPE, Forst.

Trees or shrubs. Leaves opposite or alternate, simple or 3-foliolate, rarely pinnate, pellucid-dotted. Flowers usually small, often unisexual, in axillary or terminal few- or many-flowered cymes or panicles. Sepals 4. Petals 4, valvate or imbricate, with inflexed tips. Stamens 8, inserted at the base of the disc; filaments subulate. Ovary 4-lobed almost to the base, 4-celled; style single

or 4 coalescing into 1; stigma capitate, 4-lobed; ovules 2 in each cell. Cocci 1-4, distinct, spreading, 2-valved, 1-seeded; endocarp cartilaginous or horny, separating. Seeds usually solitary; testa crustaceous, shining; albumen fleshy; embryo straight or slightly curved.

Besides the two species described below, both of which are endemic, there are 10 or 12 from the Pacific islands, 2 from tropical Asia, and 3 from Australia.

Leaves large, 3-foliolate (often 1-foliolate in var. *Mantellii*);

petioles terete 1. *M. ternata*.

Leaves small, 1-foliolate; petioles flat 2. *M. simplex*.

1. *M. ternata*, *Forst. Char. Gen.* 56.—A much-branched perfectly glabrous small tree 12-20 ft. high. Leaves opposite, 3-foliolate; leaflets 2-4 in. long, linear-obovate or elliptic-oblong or oblong-ovate, acute or obtuse, entire, finely pellucid-dotted. Flowers $\frac{1}{3}$ in. diam., greenish, often unisexual, in axillary trichotomous panicles usually longer than the petioles; pedicels short. Petals ovate-oblong, longer than the stamens, concave. Ovary glabrous; style short, stout. Cocci 4, coriaceous, spreading, strongly wrinkled and punctate. Seed black and shining, attached by a slender funicle, often protruding from the half-open valves.—*A. Rich. Fl. Nouv. Zel.* 293; *A. Cunn. Precur.* n. 582; *Hook. Ic. Plant.* t. 603; *Raoul, Choix*, 48; *Hook. f. Fl. Nov. Zel.* i. 43; *Handb. N.Z. Fl.* 40; *Kirk, Forest Fl.* t. 66; *Students' Fl.* 86. *Entoganum lævigatum*, *Gertn. Fruct.* i. 331, t. 68.

Var. *Mantellii*, *Kirk, Forest Fl.* t. 66.—Smaller, much branched; branches strict. Leaves usually much smaller, 3- or 1-foliolate; leaflets rounder, often obscurely crenate. Panicles 3-6-flowered.—*M. Mantellii*, *Buch. in Trans. N.Z. Inst.* iii. (1871) 212.

KERMADEC ISLANDS, NORTH ISLAND: Common in lowland districts. SOUTH ISLAND: Marlborough and D'Urville Island, local. Ascends to 1000 ft. *Wharangi*. September-October.

The Kermadec Island specimens have much larger and more obtuse leaflets, but do not seem to differ in other respects. Var. *Mantellii* combines the characters of *M. ternata* and *M. simplex* to an extraordinary degree, and may be a hybrid between those species.

2. *M. simplex*, *A. Cunn. Precur.* n. 583.—A glabrous shrub 6-12 ft. high, with slender twiggy branches. Leaves alternate or fascicled, rarely opposite, in young plants 3-foliolate, in mature 1-foliolate; petiole flattened or narrowly winged; leaflets small, jointed on the top of the petiole, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, rhomboid-obovate or rounded, obtuse, doubly crenate, pellucid-dotted. Flowers often unisexual, small, greenish-white; peduncles usually several together, axillary, longer than the petioles, 1- or 3-flowered. Stamens longer than the petals in the male flowers, shorter in the females. Ovary hirsute; style very short in the male flowers, longer in the females; stigma obscurely 4-lobed. Fruit as in *M. ternata*, but smaller.—*Hook. Ic. Plant.* t. 585; *Raoul, Choix*, 48; *Hook. f. Fl. Nov. Zel.* i. 43; *Handb. N.Z. Fl.* 40; *Kirk, Forest*

Fl. t. 68; *Students' Fl.* 86. *M. parvula*, *Buch. in Trans. N.Z. Inst.* xx. (1887) 255. *Astorganthus Huegelii*, *Endl. Cat. Hort. Vindob.* ii. 196.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape to Southland, ascending to 2000 ft. September–November.

The flowers are occasionally cleistogamic. (See a paper on the subject by Mr. G. M. Thomson, in *Trans. N.Z. Inst.* xxiv. 416.)

ORDER XV. MELIACEÆ.

Trees or shrubs; wood often hard, coloured, odorous. Leaves alternate, usually pinnate, rarely simple, exstipulate. Flowers regular, hermaphrodite, seldom unisexual. Calyx 4–5-lobed or -partite, usually imbricate. Petals 4–5, rarely more or 3 only, free or adnate to the lower part of the staminal tube, contorted imbricate or valvate. Stamens 8–10, seldom more or fewer; filaments united into a tube, rarely free; anthers generally sessile within the top of the tube. Disc within the staminal column, annular or tubular, free or connate with the ovary. Ovary generally free, 3–5-celled; style simple; ovules 2 in each cell, rarely more. Fruit usually a capsule, sometimes a berry, rarely drupaceous. Seeds often enclosed in an aril, with or without albumen.

An order of about 37 genera and 300 species, almost wholly confined to the tropics, rare in temperate regions. Most of the species are more or less bitter and astringent. Some yield a valuable and durable timber, as the mahogany (*Swietenia*), satinwood (*Chloroxylon*), and the so-called Australian cedar (*Cedrela australis*). The single New Zealand species belongs to a genus widely distributed in eastern tropical Asia.

1. DYSOXYLUM, Blume.

Large usually glabrous trees. Leaves simple, alternate, pinnate; leaflets entire. Flowers in lax axillary panicles. Calyx small, 4–5-toothed -lobed or -partite, imbricate. Petals 4–5, linear-oblong, spreading, valvate. Staminal tube cylindrical, dentate or crenulate at the mouth; anthers 8–10, included. Disc tubular, sheathing the ovary. Ovary 3–5-celled; ovules usually 2 in each cell. Capsule globose or pyriform, coriaceous, 1–5-celled, loculicidally 2–5-valved. Seeds with or without an aril, large, oblong, exalbuminous; cotyledons very large.

A considerable genus of large forest trees, best represented in tropical Asia and the Malay Archipelago, but with several species in Australia and the Pacific islands. The single New Zealand species is endemic.

1. *D. spectabile*, *Hook. f. Handb. N.Z. Fl.* 41.—A handsome round-headed tree 25–50 ft. high; trunk 1–3 ft. in diam. Leaves unequally pinnate, glabrous, 9–18 in. long; leaflets 3–4 pairs, alternate, petioled, 3–7 in., ovate-oblong or oblong-obovate, acute, oblique at the base, undulate. Panicles 6–18 in. long, pendulous, usually springing from the trunk or branches far below the leaves,

rarely axillary, sparingly branched. Flowers waxy-white, $1\frac{1}{2}$ in. diam., shortly pedicelled. Calyx-lobes small, ciliate. Petals 5, linear, spreading or recurved. Staminal tube cylindric, fleshy, crenate. Style slender, exerted beyond the staminal tube; stigma discoid. Capsule large, broadly obovoid, 1 in. long, 3-4-celled. Seeds 2 in each cell, enveloped in an orange aril.—*Kirk, Forest Fl.* t. 64, 65; *Students' Fl.* 87. *Hartighsea spectabilis*, *A. Juss. in Mem. Mus. Par.* xix. (1830) 228; *A. Cunn. Precur.* n. 597; *Raoul, Choix*, 47; *Hook. Ic. Plant.* t. 616, 617; *Hook. f. Fl. Nov. Zel.* i. 39. *Trichilia spectabilis*, *Forst. Prodr.* n. 188; *A. Rich. Fl. Nouv. Zel.* 306.

NORTH ISLAND: Abundant from the North Cape southwards. SOUTH ISLAND: Marlborough, D'Urville Island. Ascends to 1500 ft. *Kohokohe*. May-July.

Timber suitable for inlaying and furniture; leaves bitter and tonic.

ORDER XVI. OLACINÆÆ.

Trees or shrubs, sometimes climbing. Leaves alternate, rarely opposite, simple or lobed, exstipulate. Flowers regular, hermaphrodite or unisexual, usually cymose. Calyx 4-5-toothed or -lobed, free or adnate to the disc. Petals usually 4-5, free or more or less connate into a tube, valvate or rarely imbricate. Stamens as many or twice as many as the petals, free or adnate to them; anthers 2-celled. Disc hypogynous, usually cup-shaped, free or adnate to the ovary or calyx. Ovary free or partly immersed in the disc, 1-celled or imperfectly 2-5-celled; style simple; stigma entire or lobed; ovules 2-3, rarely 1, pendulous from the apex of a central placenta or from the side or apex of the cavity. Fruit usually drupaceous, 1-celled, 1-seeded; albumen fleshy, rarely wanting; embryo minute, radicle superior.

Genera about 40; species not far from 200; widely spread in tropical and subtropical regions, many of them very imperfectly known. The single New Zealand genus extends through Norfolk Island to Australia.

1. *PENNANTIA*, Forst.

Shrubs or trees. Leaves entire or toothed. Flowers in terminal corymbose panicles or cymes, diœcious or polygamous. Calyx minute, 5-toothed. Petals, 5, hypogynous, glabrous, valvate. Stamens 5, hypogynous, alternating with the petals; filaments filiform. Ovary 1-celled; stigma nearly sessile, entire or 3-lobed; ovule solitary, pendulous. Drupe small, fleshy; stone obtusely trigonous, grooved at the back to receive a flattened cord which passes through a perforation just below the apex, and bears the pendulous seed at its tip.

Besides the New Zealand species, which is endemic, there is one in Norfolk Island, and another in New South Wales.

1. **P. corymbosa**, *Forst. Char. Gen.* 134.—A small slender tree 15–35 ft. high; branchlets, petioles, and inflorescence pubescent. Young stage a straggling bush with numerous spreading flexuous and interlaced slender branches; leaves distant, alternate or fascicled, cuneate, $\frac{1}{4}$ – $\frac{1}{2}$ in. long or more, 3-lobed or 3–6-toothed at the tip. Leaves of mature plants shortly petioled, alternate, 1–4 in. long, obovate oblong-ovate or oblong, obtuse, sinuate or irregularly toothed or lobed, rarely entire. Flowers small, white, fragrant, diœcious. Males: Panicles and flowers larger than in the females. Filaments exceeding the petals; anthers large, oblong-sagittate, versatile, pendulous. Ovary rudimentary. Females: Filaments shorter than the petals; anthers erect. Ovary oblong; stigma 3-lobed. Drupe black, fleshy, about $\frac{1}{3}$ in. long.—*A. Rich. Fl. Nouv. Zel.* 368; *A. Cunn. Precur.* n. 576; *Raoul, Choix*, 50; *Hook. f. Fl. Nov. Zel.* i. 35, t. 12; *Handb. N.Z. Fl.* 41; *Kirk, Forest Fl.* t. 77, 78; *Students' Fl.* 88.

NORTH AND SOUTH ISLANDS: From Kaitaia southwards, but local to the north of the Waikato River. Ascends to 2000 ft. *Kaikomako*. November–December.

Wood formerly used by the Maoris to obtain fire by friction; now occasionally employed for turnery, furniture, &c.

ORDER XVII. STACKHOUSIÆÆ.

Perennial herbs, usually of small size. Leaves alternate, narrow, quite entire, often somewhat fleshy. Stipules wanting or very minute. Flowers regular, hermaphrodite, in terminal spikes or rarely solitary. Calyx 4–5-lobed or -partite, imbricate. Petals 5, perigynous, inserted on the throat of the calyx, linear or spatulate, claws long, free at the base but more or less connate above, limb reflexed. Disc thin, clothing the base of the calyx-tube. Stamens 5, inserted on the edge of the disc. Ovary free, globose, 2–5-lobed, cells the same number; style single at the base, 2–5-lobed above; ovules 1 in each cell, erect, anatropous. Fruit of 2–5 globose angular or winged indehiscent 1-seeded cocci. Seed erect, with a membranous testa; albumen fleshy; embryo straight, radicle inferior.

A small order of 2 genera and 15 species. With the exception of the New Zealand plant and another found in the Philippine Islands, the whole of the species are confined to Australia.

1. STACKHOUSIA, Smith.

Characters as above.

1. **S. minima**, *Hook. f. Fl. Nov. Zel.* i. 47.—A minute slender glabrous herb, with numerous creeping often matted underground stems, and short slender erect leafy branches $\frac{1}{2}$ –2 in. high. Leaves crowded or distant, rather fleshy, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, linear or linear-oblong

or linear-obovate, flat, acute. Flowers small, yellow, solitary and terminal, almost sessile or on very short peduncles, always exceeding the leaves. Calyx-lobes short, acute. Petals usually connate at the middle to form a tubular corolla but often altogether free, linear, acute or acuminate, tips recurved. Stamens 3 long and 2 much shorter; anthers glabrous. Ovary 3-lobed; style very short, 3-cleft. Cocci obovoid, smooth, 1 or 2 ripening, seldom 3.—*Handb. N.Z. Fl.* 42; *Kirk, Students' Fl.* 90. *S. uniflora*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 258.

NORTH ISLAND: Hawke's Bay—Open downs on the east coast, *Colenso*; Waipawa County, *H. Hill*! SOUTH ISLAND: Nelson—Mount Arthur Plateau, Wangapeka, *T. F. C.*; Spenser Mountains, *Kirk*! Canterbury—Ribband-wood Range, *Haast*; Broken River, *Enys*! Burnham, *Kirk*! Central Otago, not rare, *Petrie*! Sea-level to 4000 ft. December–January.

Sir Joseph Hooker describes the flowers as occurring in few-flowered spikes, and the anthers as pubescent; but I have not seen any specimens answering to this.

ORDER XVIII. RHAMNEÆ

Trees, shrubs, or woody climbers; branches sometimes spinescent. Leaves simple, alternate, rarely opposite, entire or toothed. Stipules small, often caducous, sometimes metamorphosed into thorns. Flowers regular, hermaphrodite or unisexual, small and inconspicuous, usually arranged in axillary or terminal cymes or panicles. Calyx 4–5-cleft, valvate. Petals 4–5, rarely wanting, inserted on the throat of the calyx-tube, small, usually hood-shaped or involute. Stamens 4–5, perigynous, inserted with the petals and opposite to them; filaments short; anthers often concealed within the involute tips of the petals. Disc perigynous, adnate to the calyx, of very various shape. Ovary free or immersed in the disc, altogether superior or more or less adnate to the calyx-tube, 3-celled, rarely 2- or 4-celled; style short; ovules solitary in each cell, erect, anatropous. Fruit free or girt by the persistent calyx-tube, drupaceous or capsular, 1–4-celled. Seed solitary, erect, sometimes arillate; albumen fleshy, rarely wanting; embryo large, erect, radicle inferior.

A well-marked order, distributed over most parts of the world. Genera about 40; species under 500. The jujube (*Zizyphus*) produces a wholesome and agreeable fruit, but as a rule most of the species possess bitter or astringent properties, and some are purgative. The 2 genera found in New Zealand both extend to Australia, and 1 of them (*Discaria*) is found in South America as well.

Tomentose, unarmed. Leaves alternate. Ovary inferior	1. POMADERRIS.
Glabrous, spiny. Leaves opposite or wanting. Ovary	
superior	2. DISCARIA.

1. POMADERRIS, Labill.

Shrubs, more or less covered with hoary or ferruginous stellate tomentum. Leaves alternate. Flowers pedicellate, in small cymes

usually forming terminal or axillary corymbs or panicles. Calyx-tube adnate to the ovary, limb 5-toothed to the base, deciduous or reflexed. Petals 5 or wanting. Stamens 5; filaments longer than the petals; anthers oblong. Disc inconspicuous, surrounding the top of the ovary at the base of the calyx-lobes. Ovary more or less inferior; style 3-fid. Capsule small, upper part protruding above the calyx-tube, 3-valved; endocarp separating into 3 cocci, which either split down the inner face or open by an oblong lid. Seed on a thickened funicle.

A genus of about 22 species, restricted to Australia, New Caledonia, and New Zealand. Three of the New Zealand species are also found in Australia; he fourth is endemic.

* Flowers with petals.

Leaves 2-3 in., elliptic-oblong, obtuse, entire 1. *P. elliptica*.

** Flowers without petals.

Leaves 2-4 in., oblong-ovate, crenulate; tomentum white or grey 2. *P. apetala*.

Leaves $\frac{3}{4}$ -2 in., oblong or oblong-lanceolate; tomentum often ferruginous 3. *P. Edgerleyi*.

Leaves small, linear or oblong, $\frac{1}{8}$ - $\frac{1}{4}$ in., margins revolute to the midrib 4. *P. phyllicæfolia*.

1. ***P. elliptica***, *Lab. Nov. Holl. Pl.* i. 61, t. 86.—A sparingly branched shrub 4-8 ft. high; young branches, petioles, leaves beneath, and inflorescence densely clothed with fine white or buff stellate tomentum. Leaves shortly petiolate, 2-3 in. long, elliptic-oblong or ovate-oblong, obtuse or acute, quite entire, glabrous above, veins and midrib prominent beneath. Cymes numerous, terminal, forming large much-branched corymbose panicles. Flowers bright-yellow, $\frac{1}{5}$ - $\frac{1}{4}$ in. diam. Calyx covered with stellate tomentum mixed with long silky hairs. Petals with a broad blade with crisped margins and a long slender claw. Capsule small, the free portion shorter than the calyx-tube. Cocci opening by an oblong lid on the inner face.—*Bot. Mag.* t. 1510; *Hook. f. Fl. Nov. Zel.* i. 46; *Handb. N.Z. Fl.* 43; *Benth. Fl. Austral.* i. 417; *Kirk, Students' Fl.* 91. *P. Kumeraho*, *A. Cunn. Precur.* n. 577; *Raoul, Choix*, 50.

NORTH ISLAND: North Cape to Tauranga Harbour, on open clay hills. *Kumarahou*. September. Also in south-east Australia and Tasmania.

2. ***P. apetala***, *Lab. Nov. Holl. Pl.* i. 52, t. 87.—A shrub or small tree 6-15 ft. high, rarely more; branchlets, undersurface of leaves, and inflorescence covered with dense white or greyish stellate tomentum. Leaves petiolate, 2-4 in. long, oblong-ovate or oblong-lanceolate, obtuse or subacute, irregularly crenulate, glabrous and wrinkled above, veins prominent below. Flowers small, numerous, in terminal and axillary panicles 3-7 in. long. Calyx-tube short, clothed with stellate hairs. Petals wanting.

Anthers tipped by a minute gland. Style 3-fid to the middle. Capsule obtuse, sparsely covered with stellate hairs. Cocci opening by a valve on the inner face.—*Benth. Fl. Austral.* i. 419; *Kirk, Forest Fl.* t. 8; *Students' Fl.* 92. *P. Tainui*, *Hector in Trans. N.Z. Inst.* xi. (1879) 429. *P. mollis*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 327.

NORTH ISLAND: Formerly abundant at Kawhia, but now extinct; between Kawhia and Mokau, *Gilbert*; between the Mokau and Mohakatina Rivers, *Hector*! *Kirk*! CHATHAM ISLANDS: *F. A. D. Cor.* Also naturalised in Hawke's Bay, and at Geraldine, Canterbury. *Tainui*. October–November.

A common Australian plant. The Maoris assert that it sprang from the rollers or skids that were brought in the canoe "*Tainui*" when they first colonised New Zealand.

3. ***P. Edgerleyi***, *Hook. f. Handb. N.Z. Fl.* 43. — An erect or spreading shrub, variable in habit and size, 2–8 ft. high; branchlets, undersurface of leaves, petioles, and inflorescence densely clothed with soft loose whitish or ferruginous stellate tomentum. Leaves shortly petioled, $\frac{3}{4}$ –2 in. long, oblong linear-oblong or lanceolate-oblong, obtuse at both ends, rarely acute, glabrous or scabrid above, with impressed veins; midrib and principal veins prominent beneath. Cymes axillary and terminal, usually broad and corymbose, more rarely lax and racemose. Flowers small, yellowish. Calyx-lobes large, ovate, acute, reflexed, midrib prominent. Petals wanting. Ovary entirely sunk in the calyx-tube; style 3-cleft almost to the base.—*Kirk, Students' Fl.* 91. *Pomaderris* (?) sp. *Hook. f. Fl. Nov. Zel.* i. 46.

NORTH ISLAND: North Cape to Mercury Bay, but often local. Sea-level to 1500 ft. October–November. Endemic.

There are two forms of this species—one a small shrub with straggling or procumbent branches, and small oblong leaves scabrid above and clothed with bright ferruginous tomentum beneath; the other taller and fastigiately branched, with longer and narrower leaves, glabrous above and with paler tomentum beneath.

4. ***P. phyllicæfolia***, *Lodd. Bot. Cab.* t. 120. — A small heath-like shrub 1–4 ft. high; branches densely villous, spreading or erect, fastigiate. Leaves small, of very young plants $\frac{1}{2}$ – $\frac{3}{4}$ in. long, oblong or ovate, obtuse, flat, hairy on both surfaces; of older plants $\frac{1}{8}$ – $\frac{1}{3}$ in. long, nearly sessile, spreading, linear or linear-oblong, grooved down the middle and scabrid with short white hairs above, margins revolute to the midrib, concealing nearly the whole of the villous undersurface. Flowers minute, in small axillary cymes slightly longer than the leaves, very abundantly produced. Calyx small, densely pubescent, lobes spreading. Petals wanting. Capsule ovoid, hirsute; cocci opening along the whole length of the inner face.—*Benth. Fl. Austral.* i. 422; *Hook. f. Handb. N.Z. Fl.* 43; *Kirk, Students' Fl.* 92. *P. ericifolia*, *Hook. in Journ. Bot.* i. (1834) 257;

A. Cunn. Precur. n. 578; *Raoul, Choix*, 50; *Hook. f. Fl. Nov. Zel.* i. 46. *P. amœna*, *Col. in Trans. N.Z. Inst.* xvii. (1886) 258.

NORTH ISLAND: North Cape to Otaki and Cape Palliser, plentiful in open country, ascending to over 2000 ft. *Tauhunu.* November–December. Also found in Victoria and Tasmania.

2. **DISCARIA**, Hook.

Much-branched rigid shrubs or small trees, with opposite often spinous branchlets. Leaves opposite or fascicled, sometimes wanting. Flowers axillary. Calyx membranous, free or adnate to the ovary at the base; limb campanulate, 4–5-lobed. Petals 4–5, hooded, often wanting. Stamens 4–5; filaments short. Disc adnate to the base of the calyx-tube, annular. Ovary more or less sunk in the disc, 3-lobed, 3-celled; style slender; stigma 3-lobed. Drupe (or capsule) dry, coriaceous, 3-lobed, endocarp separating into 3 2-valved crustaceous cocci. Seeds with a coriaceous testa.

Species about 16, mostly natives of extratropical and alpine South America, with 1 species in Australia and another in New Zealand.

1. **D. Toumatou**, *Raoul, Choix de Plantes*, 29, t. 29.—A much-branched thorny bush or small tree 2–15 ft. high or even more, glabrous or slightly puberulous. Branches divaricating, flexuous; young ones green, terete; branchlets reduced to opposite distichous or decussate rigid spines $1\frac{1}{2}$ –2 in. long. Leaves often wanting, fascicled below the axils of the spines or opposite on short shoots, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, linear-obovate or oblong-obovate, obtuse. Flowers small, $\frac{1}{8}$ in. diam., greenish-white, fascicled with the leaves below the axils of the spines; pedicels short, puberulous. Calyx-lobes 4–5, reflexed. Petals wanting. Capsule $\frac{1}{2}$ in. diam., globose, deeply 3-lobed.—*Hook. f. Handb. N.Z. Fl.* 44; *Kirk, Forest Fl.* t. 136; *Students' Fl.* 93. *D. australis*, *Hook.*, var. *apetala*, *Hook. f. Fl. Nov. Zel.* i. 47. *Notophœna Toumatou*, *Miers in Ann. & Mag. Nat. Hist.* Ser. iii. v. (1860) 271.

NORTH AND SOUTH ISLANDS: Waikato River to the Bluff, common. Ascends to 3500 ft. *Tumatukuru.* November–January.

Can only be distinguished from the Australian and Tasmanian *D. australis* by the absence of petals. It attains a large size in the cool mountain-valleys of the South Island, but near the coast is usually low and scrubby.

ORDER XIX. **SAPINDACEÆ.**

Trees, shrubs, or woody climbers, rarely herbs. Leaves alternate or more rarely opposite, often compound, exstipulate, seldom stipulate. Flowers regular or irregular, generally unisexual or polygamous; inflorescence very various. Calyx 3–5-lobed or of as many free sepals, divisions often unequal in size, imbricate or valvate. Petals 3–5 or wanting, free, equal or unequal, often bearded or glandular at the base within, imbricate. Disc very various,

annular or unilateral, rarely wanting. Stamens 5-10, in the great majority of the order (but not in the New Zealand genera) inserted inside the disc at the base of the ovary, more rarely outside or on the disc, sometimes unilateral; anthers basifixed or versatile, 2-celled. Ovary free, central or excentric, entire lobed or partite, 1-4-celled; style simple or divided, usually terminal; ovules 1-2 in each cell, seldom more. Fruit very various, capsular or indehiscent, dry or succulent, entire or lobed, sometimes winged. Seeds globose or compressed, with or without an aril; albumen wanting or more rarely present; embryo generally thick, sometimes folded or spirally twisted, radicle short, inferior.

A polymorphous order, exceedingly difficult to characterize as a whole, and often separated into 3 or 4 distinct ones. As defined above, it comprises about 80 genera and between 600 and 700 species, many of them very imperfectly known. It is chiefly tropical, but extends through both of the temperate zones. The properties of the order are very various. The maples contain a sweetish sap, from which sugar is obtained. Several species of *Nephelium*, such as the *Litchi* and *Longan*, produce some of the most delicious of Asiatic fruits. Many species contain bitter or astringent principles, while others, as some of the American species of *Serjania* and *Paullinia*, are reputed to be poisonous. The two genera found in New Zealand belong to the tribe *Dodonæa*, which has regular flowers, stamens inserted outside the disc (not inside), and exalbuminous seeds. *Alectryon* is endemic, but *Dodonæa* is most abundant in Australia, extending also through the tropics of both hemispheres.

Leaves simple in the New Zealand species. Disc wanting.

Capsule membranous, often winged 1. DODONÆA.
Leaves pinnate. Disc 8-lobed. Capsule woody, turgid .. 2. ALECTRYON.

1. DODONÆA, Linn.

Shrubs or small trees, often viscid with a resinous exudation. Leaves alternate, exstipulate. Flowers unisexual or polygamous, in terminal or axillary racemes or panicles, rarely solitary. Sepals 2-5, imbricate or valvate. Petals wanting. Stamens 5-10, usually 8; filaments short; anthers linear-oblong. Ovary 3-6-celled, with 2 ovules in each cell. Capsule membranous or coriaceous, 2-6-sided, septically 2-6-valved; valves winged at the back. Seeds 1-2 in each cell, lenticular or subglobose, compressed, with a thickened funicle but not arillate; embryo spirally coiled.

A genus comprising about 50 species, fully 40 of which are confined to Australia, the remainder scattered through the tropical or subtropical regions of both hemispheres. The New Zealand species is found in most warm countries.

1. *D. viscosa*, Jacq. *Enum. Pl. Carib.* 19.—Usually a glabrous shrub or small tree 8-20 ft. high, but occasionally dwarfed to 1-3 ft., and sometimes attaining 30-35 ft.; trunk seldom more than 12 in. diam.; young branches usually compressed or triangular, viscid. Leaves 1-3 in. long, narrow linear-obovate or oblanceolate, obtuse, rarely acute, entire, gradually narrowed into a short petiole. Flowers small, greenish or reddish, in few-flowered terminal panicles,

diœcious. Male flowers: Sepals 4, free, oblong or ovate. Stamens 8–10, rather longer than the sepals; filaments very short. Females: Sepals narrower, more erect. Style stout, 2-fid, long-exserted. Capsule $\frac{3}{4}$ in. diam., compressed, orbicular, very broadly 2–3-winged, 2-lobed at each end; wings veined, membranous.—*Hook. f. Fl. Nov. Zel.* i. 38; *Handb. N.Z. Fl.* 45; *Kirk, Forest Fl.* t. 17; *Students' Fl.* 94. *D. spathulata*, *Smith in Rees Cyclop.* xii. n. 2; *A. Rich. Fl. Nouv. Zel.* 308; *A. Cunn. Precur.* n. 599; *Raoul, Choix*, 47.

NORTH AND SOUTH ISLANDS: From the North Cape as far south as Banks Peninsula, chiefly in lowland districts. *Akeake.* September–November.

Wood hard and heavy; formerly much used by the Maoris for making clubs, spears, &c.

2. **ALECTRYON**, Gærtn.

A lofty tree. Leaves alternate, pinnate, exstipulate; leaflets entire or toothed. Flowers hermaphrodite or unisexual, in axillary or terminal many-flowered panicles. Calyx 4–5-lobed, villous within, lobes unequal, imbricate. Petals wanting. Disc small, 8-lobed. Stamens 5–8, inserted within the lobes of the disc; anthers large. Ovary obliquely obcordate, compressed, 1-celled; style short; stigma simple or 2–3-lobed; ovule solitary. Capsule coriaceous or almost woody, subglobose, turgid, with a flattened prominence or crest towards the top. Seed subglobose, arillate; testa crustaceous; cotyledons spirally coiled.

A monotypic genus confined to New Zealand.

1. **A. excelsum**, Gærtn. *Fruct.* i. 216, t. 46.—A handsome tree 30–60 ft. high, with a trunk 2 ft. in diam. or more; bark black; young branches, leaves below, inflorescence, and capsules clothed with silky ferruginous pubescence. Leaves unequally pinnate, 4–12 in. long; leaflets 4–6 pairs, shortly petioled, 2–4 in. long, obliquely ovate-lanceolate, acuminate, entire or obscurely remotely toothed, membranous. Panicles 4–12 in. long, much branched. Anthers large, dark-red. Ovary pilose. Capsule $\frac{1}{3}$ – $\frac{1}{2}$ in. long, opening transversely but irregularly. Seed large, almost globose, jet-black and shining, half imbedded in a bright scarlet fleshy cup-shaped aril.—*A. Cunn. Precur.* n. 598; *Hook. Ic. Plant.* t. 570; *Raoul, Choix*, 47; *Hook. f. Fl. Nov. Zel.* i. 38; *Handb. N.Z. Fl.* 45; *Kirk, Forest Fl.* t. 92, 93; *Students' Fl.* 95.

Var. **grandis**, *Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 409.—Leaves much larger, 12–18 in. long; leaflets 2–3 pairs, 5–7 in. long, oblong or ovate, obtuse or subacute, entire or with 2–3 coarse teeth. Flowers not seen, and only fragments of old capsules.

NORTH AND SOUTH ISLANDS: North Cape to Banks Peninsula and Westland, common. Var. **grandis**: Three Kings Islands, *T. F. C.* Ascends to 2000 ft. *Titoki.* October–December.

Yields a tough and elastic timber, valuable for axe-handles, bullock-yokes, &c. The Maoris formerly extracted an oil from the seeds. Var. **grandis** is doubtless a distinct species, but in the absence of flowers and fruit I hesitate to describe it as such.

ORDER XX. ANACARDIACEÆ.

Trees or shrubs, often exuding a resinous and usually acrid juice. Leaves alternate, simple or compound, exstipulate. Flowers regular, small, hermaphrodite, unisexual or polygamous. Calyx 3-5-partite, imbricate. Petals 3-7, rarely wanting, free, perigynous, imbricate. Disc usually annular or cup-shaped, entire or lobed. Stamens as many or twice as many as the petals, inserted under or upon the disc; filaments usually free; anthers 2-celled. Ovary superior, usually 1-celled, sometimes 2-5-celled, very rarely of 2-5 free carpels; styles 1-3; ovules solitary in the cells, either pendulous from the top or wall or from a basal funicle. Fruit superior or very rarely half-inferior, usually a 1-5-celled 1-5-seeded drupe. Seed exalbuminous; embryo straight or curved, cotyledons usually fleshy, radicle short.

A large order of nearly 50 genera and about 450 species, chiefly tropical in its distribution, rare in temperate regions. It includes several edible species, as the mango (probably the best of the tropical fruits), the hog-plum (*Spondias*), the Pistachia nut, &c. Some species of *Rhus* and other genera secrete a more or less poisonous and acrid juice; others produce valuable varnishes. The single New Zealand genus is endemic.

1. CORYNOCARPUS, Forst.

A tree, everywhere perfectly glabrous. Leaves large, alternate simple and entire. Flowers small, greenish, in terminal branched panicles. Calyx 5-lobed; lobes rounded, imbricate. Petals 5 rounded, erose, imbricate. Disc fleshy, 5-lobed. Stamens 5, inserted on the disc, alternating with as many petaloid staminodia. Ovary sessile, ovoid, 1-celled, narrowed into an erect style; stigma capitate; ovule solitary, pendulous from near the top of the cell. Drupe large, obovoid, obtuse, fleshy; endocarp forming a coriaceous and fibrous network round the seed. Seed pendulous; testa membranous, adhering to the cavity of the cell; embryo thick; cotyledons plano-convex; radicle minute, superior.

A genus consisting of a single species, peculiar to New Zealand. It is a somewhat doubtful member of the *Anacardiaceæ*, as it wants the resin-canals so characteristic of the family, and also differs in the andrœcium. Professor Engler, in "Die Natürlichen Pflanzenfamilien," has proposed that it should form the separate-order *Corynocarpaceæ*.

1. *C. lævigata*, Forst. Char. Gen. 31, t. 16. — A handsome leafy tree 30-40 ft. high, with a trunk 1-2 ft. diam. or more. Leaves 3-8 in. long, elliptic-oblong or oblong-obovate, subacute, narrowed into a short stout petiole, thick and coriaceous, dark-green and glossy; margins slightly recurved. Panicles 4-8 in. long, broad, rigid, erect, much branched. Flowers small, $\frac{1}{8}$ in. diam., on short stout pedicels. Petals concave, barely exceeding the calyx-lobes. Filaments stout, subulate. Ovary small, glabrous. Drupe 1-1 $\frac{1}{2}$ in. long, orange.—*A. Rich. Fl. Nouv. Zel.* 365; *A. Cunn. Precur.* n. 638; *Raoul, Choix*, 50; *Bot. Mag.* t. 4379;

Hook. f. Fl. Nov. Zel. i. 49; *Handb. N.Z. Fl.* 46; *Kirk, Forest Fl.* t. 88; *Students' Fl.* 96.

KERMADEC ISLANDS, NORTH ISLAND, CHATHAM ISLANDS: Abundant, chiefly in lowland situations not far from the sea. SOUTH ISLAND: Marlborough and Nelson to Banks Peninsula and Westland, but very rare and local. *Karaka*. August–November.

The pulpy part of the fruit is edible; but the seed is highly poisonous unless steamed, or steeped in salt water. See Mr. Colenso's valuable paper "On the Vegetable Food of the New-Zealanders" (*Trans. N.Z. Inst.* xiii. 25), also notes by Mr. Skey and Mr. Colenso (*l.c.* iv. 316). The wood is soft and almost useless.

ORDER XXI. CORIARIEÆ.

Glabrous shrubs, sometimes small and almost herbaceous; branches angular, the lower opposite. Leaves opposite or rarely in whorls of 3, entire, exstipulate. Flowers regular, hermaphrodite or polygamous, small, usually in axillary racemes. Sepals 5, imbricate, persistent. Petals 5, hypogynous, smaller than the sepals, keeled within, enlarged after flowering and becoming thick and fleshy and embracing the fruit. Stamens 10, hypogynous, free, or the alternate ones adnate to the petals; filaments short; anthers large. Disc absent. Carpels 5–10, free, 1-celled, whorled on a short conical receptacle; styles as many as the carpels, free, thick, elongated, covered for the whole length with stigmatic papillæ; ovules solitary, pendulous from the top of the cell. Fruit of 5–10 oblong indehiscent cocci, closely embraced by the fleshy and juicy petals, 1-celled, 1-seeded. Seed with a membranous testa; albumen a thin layer only; embryo with plano-convex cotyledons and a superior radicle.

A small order of very doubtful relationship, comprising the single genus *Coriaria*. Species 8 or 10, found in New Zealand, South America, Japan, China, the Himalayas, north Africa, and south Europe.

1. CORIARIA, Linn.

Characters of the order, as above.

Shrub or small tree. Leaves 1–3 in., oblong-ovate.

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|--|-----------------------------|
| Racemes drooping | 1. <i>C. ruscifolia</i> . |
| Suffrutescent or herbaceous. Leaves $\frac{1}{2}$ –1 in., ovate-lanceolate | 2. <i>C. thymifolia</i> . |
| Herbaceous. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., narrow-linear | 3. <i>C. angustissima</i> . |

1. *C. ruscifolia*, Linn. *Sp. Plant.* 1037. — A shrub or small tree with spreading 4-angled branches, very variable in height and degree of robustness, sometimes attaining 25 ft. with a trunk 10 in. diam., at others not more than 2–4 ft., with almost herbaceous stems. Leaves 1–3 in., ovate or oblong-ovate, acute or acuminate, rounded or cordate at the base, sessile or very shortly petioled, 3–5-nerved. Racemes drooping, many-flowered, 4–12 in. long or more, slightly pubescent; pedicels slender, $\frac{1}{4}$ – $\frac{1}{2}$ in., bracteolate at

the base. Flowers small, green, $\frac{1}{8}$ – $\frac{1}{5}$ in. diam., strongly protogynous. Sepals broadly ovate, subacute. Filaments elongating after fertilisation. Fruit globose, purplish-black, of 5–8 cocci enveloped by the persistent enlarged juicy petals.—*Hook. f. Fl. Nov. Zel.* i. 45; *Handb. N.Z. Fl.* 46; *Kirk, Forest Fl.* t. 139; *Students' Fl.* 97. *C. sarmentosa*, *Forst. Prodr.* n. 377; *A. Rich. Fl. Nouv. Zel.* 364; *Bot. Mag.* t. 2470; *A. Cunn. Precur.* n. 581; *Raoul, Choix*, 47. *C. arborea* and *C. tutu*, *Lindsay, Contrib. N.Z. Bot.* 84.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 3500 ft. *Tutu*; *Tupakihi*.

Most parts of the plant are poisonous, and particularly the young shoots and seeds. The poisonous principle appears to be a glucoside, to which the name "tutin" has been applied. For particulars, reference should be made to a paper by Prof. Easterfield and Mr. B. C. Aston, published by the New Zealand Department of Agriculture. The juice expressed from the fleshy petals is quite innocuous, and is used as a non-intoxicating drink by the Maoris.

2. *C. thymifolia*, *Humb. and Bonp. ex Willd. Sp. Plant.* iv. 819.—A small suffruticose or herbaceous plant 6 in. to 4 ft. high; rootstock often stout, woody, much branched; stems and branches slender, with winged angles, often flattened in one plane. Leaves variable in size, $\frac{1}{8}$ –1 in., oblong-ovate ovate-lanceolate or lanceolate, acute or acuminate, sessile or very shortly petioled, glabrous or slightly pubescent. Racemes 1–4 in. long, slender, spreading, pubescent. Flowers rather smaller than in *C. ruscifolia*, often unisexual.—*Hook. f. Fl. Nov. Zel.* i. 45; *Handb. N.Z. Fl.* 47; *Lindsay, Contrib. N.Z. Bot.* 87; *Kirk, Students' Fl.* 98. *C. lurida*, *Kirk, l.c.*

NORTH AND SOUTH ISLANDS: Mountainous districts from Taupo and the East Cape southwards. 1000–5000 ft. *Tutupapa*.

In its ordinary state this is distinct enough; but large-leaved forms pass directly into *C. ruscifolia*, and narrow-leaved varieties into *C. angustissima*. I cannot separate Mr. Kirk's *C. lurida* even as a variety.

3. *C. angustissima*, *Hook. f. Handb. N.Z. Fl.* 47.—Rootstock stout, branched. Stems herbaceous, slender, tufted, often covering large patches. Branches numerous, dense, almost plumose; branchlets filiform or almost capillary. Leaves very numerous, small, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, narrow-linear or linear-subulate, sessile or very shortly petioled, acuminate. Racemes 1–3 in. long, slender, glabrous or nearly so. Flowers small, very similar to those of *C. thymifolia*, often unisexual. Fruit rather large, globose, almost black.—*Lindsay, Contrib. N.Z. Bot.* 87; *Kirk, Students' Fl.* 98.

NORTH ISLAND: Mount Egmont, *Dieffenbach*; Ruahine Range, *Colenso* (Handbook). SOUTH ISLAND: Subalpine localities in Canterbury and Otago. 1500–4000 ft. December–January.

I have seen no North Island specimens, and suspect that slender fine-leaved forms of *C. thymifolia* have been taken for it in the localities quoted above.

ORDER XXII. **LEGUMINOSÆ.**

Herbs, shrubs, or trees, of very various habit. Leaves usually alternate, stipulate, compound, rarely simple, sometimes wanting. Flowers generally irregular, hermaphrodite, occasionally regular and polygamous. Sepals 5, usually cohering into a more or less deeply divided calyx, sometimes free, often unequal, occasionally 2-lipped. Petals 5, seldom fewer, perigynous or rarely hypogynous, either papilionaceous or more or less regularly spreading. Stamens 10, rarely less or more, perigynous or almost hypogynous; filaments either free or all connate into a tube surrounding the ovary, or more generally 9 of them united and 1 free. Ovary free, 1-celled, consisting of a single carpel; style simple; ovules 1 to many, attached to the ventral suture. Fruit a pod splitting open along both sutures, rarely indehiscent or transversely breaking up into 1-seeded joints. Seeds nearly always exalbuminous; embryo with large foliaceous or amygdaloidal cotyledons and a short radicle.

SUBORDER PAPILIONACEÆ.

All the indigenous genera belong to this suborder, which is characterized as follows: Corolla irregular and papilionaceous, seldom almost regular. Petals imbricate, the uppermost (or standard) always outside in the bud. Stamens definite, usually 10.

With the exception of *Compositæ*, this is the largest order of flowering plants, comprising over 400 genera and about 7000 species. Next to *Gramineæ*, it is the most serviceable to man for food; and it produces more substances used in the arts and medicine than any other order. Its distribution is practically world-wide; but it is singularly rare in New Zealand, the proportion of species being much smaller than in any other country of equal size. In fact, the paucity of *Leguminosæ* is one of the most remarkable peculiarities of the New Zealand flora, especially taking into account that the order is the one most strongly developed in Australia, the nearest land-area to New Zealand. Of the 7 indigenous genera, *Carmichaelia* has an outlying species in Lord Howe Island, but is otherwise restricted to New Zealand; while the two closely allied genera *Corallospartium* and *Notospartium* are endemic. *Clianthus* has 1, or perhaps 2, species in Australia, and 1 in the Malay Archipelago; *Swainsona* is largely represented in Australia; while *Canavalia* and *Sophora* are widely distributed in warm climates. A list of the naturalised species, with references to descriptions, will be found in the appendix.

* Shrubs, sometimes very small; branches flattened, compressed or nearly terete, grooved or striate, leafless or nearly so when adult.

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| Branches stout, terete, deeply grooved. Pods compressed, 1-seeded, dehiscing along the sutures | 1. CORALLOSPARTIUM. |
| Branchlets compressed or terete. Pods short, few-seeded; valves falling away from the persistent thickened sutures, to which the seeds remain attached, or rarely the pod is indehiscent | 2. CARMICHAELIA. |
| Branchlets terete or compressed, slender, pendulous. Pods narrow-linear, torulose, 2-10-seeded, indehiscent | 3. NOTOSPARIUM. |

** Branches not flattened nor compressed, leafy.

- Shrub. Racemes pendulous; flowers large, crimson. Pod terete, many-seeded 4. *CLIANTHUS*.
 Small alpine herb. Racemes erect. Pod membranous, inflated 5. *SWAINSONA*.
 Large twiner. Leaves 3-foliolate. Calyx 2-lipped. Stamens monadelphous. Pod large and broad 6. *CANAVALIA*.
 Tree or shrub. Leaves pinnate with many leaflets. Racemes pendulous. Flowers large, yellow. Stamens free. Pod moniliform 7. *SOPHORA*.

1. *CORALLOSPARTIUM*, J. B. Armstrong.

A leafless shrub. Stems and branches stout, cylindric, deeply grooved. Flowers in dense fascicles at the notches of the branchlets. Calyx woolly, campanulate, 5-toothed; teeth about equal. Standard large, broad, reflexed, contracted into a short claw. Wings falcate, oblong, obtuse, auricled towards the base, shorter than the keel. Keel about equalling the standard, incurved, oblong, obtuse. Upper stamen free, the others connate into a sheath. Ovary densely villous; style silky at the base; ovules 2-4. Pod 2-valved, deltoid, rounded and winged at the back, straight in front, shortly beaked, villous; valves thin, faintly reticulated, edges not thickened nor consolidated into a replum. Seed solitary, reniform; radicle with a double flexure.

A genus of a single species, endemic in New Zealand. It is technically separated from *Carmichaelia* by the 2-valved pod without a persistent replum.

1. *C. crassicaule*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 333.—Stems erect, 1-6 ft. high, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., sparingly branched, yellow, stout, erect, cylindrical, with numerous parallel tomentose grooves; branchlets compressed at the tips. Leaves rarely seen on mature plants, when present very fugacious, small, linear-oblong or ovate-oblong; of young plants broadly oblong or almost orbicular, entire or emarginate. Fascicles capitate, densely 8-20-flowered; pedicels short, slender, and with the calyces softly woolly. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. long, cream-coloured. Pod $\frac{1}{4}$ in. long.—*Kirk, Students' Fl.* 106. *Carmichaelia crassicaulis*, *Hook. f. Handb. N.Z. Fl.* 48.

Var. *racemosa*, *Kirk, Students' Fl.* 107. — Branchlets narrower, $\frac{1}{8}$ in. broad, compressed. Flowers less than $\frac{1}{4}$ in. long, solitary or in 3-5-flowered racemes, which are solitary or fascicled. Pedicels and calyx not so woolly.

SOUTH ISLAND: Canterbury—Mount Torlesse, *Haast*! Lake Lyndon, *Enys*! T. F. C.; Mount Dobson and other mountains flanking the Mackenzie Plains, T. F. C.; Lake Ohau, *Haast*. Otago—Lindis Pass, *Hector* and *Buchanan*! Naseby and westward to the Dunstan Mountains, *Petrie*! H. J. Matthews! 1500-4000 ft. Coral-broom. December-January.

One of the most remarkable plants in the colony; at once recognised by the robust deeply grooved branchlets, densely fascicled flowers, and woolly calyx. It appears to be confined to arid situations on the eastern slopes of the Southern Alps.

2. CARMICHÆLIA, R. Br.

Erect or depressed shrubs, some species attaining a height of 6–10 ft., others reduced to broad matted patches hardly rising more than an inch or two above the ground. Branchlets flattened or terete, grooved or striate, green. Leaves often absent, except in seedlings; when present deciduous after the flowers have fallen, 1-foliate or pinnately 3–5-foliate. Flowers small, in lateral racemes springing from notches on the edges of the branchlets, rarely solitary. Calyx campanulate or cup-shaped, 5-toothed. Standard orbicular, usually reflexed, contracted into a short claw. Wings more or less falcate, oblong, obtuse, auricled towards the base. Keel oblong, incurved, obtuse, shorter or longer than the standard. Upper stamen free, the others connate into a sheath. Ovary narrowed into a slender beardless style; stigma minute, terminal; ovules numerous. Pod small, coriaceous, narrow-oblong to almost orbicular, straight or oblique, compressed or turgid, narrowed into a short or long subulate beak; valves with the edges thickened and consolidated, forming a kind of framework called the replum, from which the faces of the valves come away; or in a few species the valves remain attached to the replum and the pod is indehiscent. Seeds 1–12, reniform or oblong; radicle usually with a double fold.

A very remarkable genus, confined to New Zealand, with the exception of one species found in Lord Howe Island. Its habit is peculiar, most of the species being leafless or nearly so when mature, the green flattened or terete branchlets (cladodes) performing the functions of true leaves. The structure of the pod is most exceptional, the margins of the valves and placentas being thickened and consolidated into a framework (replum), to which the seeds are attached. In dehiscence the faces of the valves either come away altogether from the replum, which may persist for a long time with the seeds hanging from it, or the valves may separate at one side or end, remaining attached at the other. In the four species constituting the section *Huttonella* the valves do not usually separate from the replum, which is frequently incomplete, and the pod is thus indehiscent. Had this character been constant, *Huttonella* might well have been kept as a distinct genus, as proposed by Kirk. But fruiting specimens of *C. juncea* in Mr. Colenso's herbarium show that the valves occasionally separate from the replum in that species, and Mr. Petrie informs me that the same thing occurs in his *C. compacta*.

The discrimination of the species is probably more difficult in *Carmichaelia* than in any other genus in the New Zealand flora, and the student will find it almost impossible to name his specimens with accuracy until he has collected most of the species and become familiar with their characters. In most cases characters based upon the vegetative organs are by themselves useless. The leaves, when they can be examined, are singularly uniform; and the branchlets are not only highly variable in width, but may be flattened in spring and nearly terete in autumn. The flowers vary in size and colour in the different species, but present no important structural modifications. The pods afford the most trustworthy characters, and in several cases are alone quite sufficient for the identification of the species. The following analysis of the species is in many respects imperfect, and will doubtless require considerable modification. A really comprehensive and accurate account cannot be drawn up until the species have been carefully studied in the field at different seasons of the year, and in all stages of growth. It is specially important, in order to form a safe basis for future work, that flowering and fruiting specimens should be taken from the same plant.

A. Much depressed leafless plants forming matted patches 1-4 in. high.
Flowers usually reddish.

* Branchlets thin, linear or narrow linear.

Flowers solitary or racemose. Pods obliquely ovate-orbicular, usually 1-seeded

Flowers solitary; peduncles long. Pods 3-4-seeded 1. *C. Enysii*.

Flowers racemose. Pods 3-6-seeded 2. *C. uniflora*.

Flowers racemose. Pods 3-6-seeded 3. *C. nana*.

** Branchlets very stout and thick, flattened, with rounded edges.

Flowers racemose. Pods large, turgid, 6-14-seeded 4. *C. Monroi*.

B. Erect or spreading shrubs 1-10 ft. high. Flowers usually purplish or streaked with purple, rarely white. Valves of the pod separating from the persistent replum.

* Usually leafless when mature (sometimes leafy in 8, *C. subulata*).

† Branchlets broad, flat, and thin.

Branchlets $\frac{1}{3}$ - $\frac{1}{2}$ in. broad. Flowers large, $\frac{3}{4}$ -1 in. Pod 1 in., turgid 5. *C. Williamsii*.

Branchlets $\frac{1}{5}$ - $\frac{1}{3}$ in. Flowers small, $\frac{1}{8}$ - $\frac{1}{6}$ in. Pod $\frac{1}{3}$ - $\frac{1}{2}$ in.; valves slightly convex. Seeds red 6. *C. australis*.

†† Branchlets narrow, terete, plano-convex or compressed.

Branchlets very stout, often terete, $\frac{1}{12}$ - $\frac{1}{8}$ in. diam. Pod $\frac{1}{4}$ - $\frac{1}{2}$ in., turgid. Seeds 2-6 7. *C. Petriei*.

Branchlets slender, compressed or plano-convex, $\frac{1}{10}$ - $\frac{1}{6}$ in. diam. Pod $\frac{1}{4}$ - $\frac{1}{3}$ in., turgid, subulate, acuminate. Seeds usually 2 8. *C. subulata*.

Branchlets slender, terete or plano-convex, $\frac{1}{15}$ - $\frac{1}{10}$ in. diam. Pod $\frac{1}{3}$ in., oblong, turgid, narrowed below 9. *C. virgata*.

Branchlets very slender, almost filiform. Pod small, $\frac{1}{8}$ - $\frac{1}{5}$ in., obliquely oblong. Seed 1, rarely 2 10. *C. diffusa*.

** Usually leafy in spring and early summer (sometimes leafless in *C. flagelliformis*).

† Pod more or less compressed, or only slightly convex.

Branchlets glabrous, deeply grooved, erect. Racemes 5-12-flowered. Flowers large, $\frac{1}{4}$ in. Pod oblong, beak rather long 11. *C. grandiflora*.

Branchlets pubescent, compressed, drooping. Racemes 10-20-flowered. Flowers small, $\frac{1}{8}$ - $\frac{1}{6}$ in. Pod oblong, narrowed into a long beak 12. *C. odorata*.

Branchlets glabrous, compressed or terete. Racemes 10-40-flowered. Pod narrowed into a long beak 13. *C. angustata*.

Branchlets slender, grooved, often fastigiate. Racemes 3-7-flowered. Flowers small. Pod obliquely ovate, suddenly narrowed into a long beak 14. *C. flagelliformis*.

†† Pod conspicuously turgid.

Stems slender, often twining. Branchlets almost filiform, grooved. Flowers large, $\frac{1}{3}$ - $\frac{1}{2}$ in. Pod elliptic, beak very long 15. *C. gracilis*.

C (*Huttonella*). Erect or prostrate shrubs 1-4 ft. high. Flowers small. Pod small, usually indehiscent, swollen, often broader than deep; beak turned abruptly upwards.

* Leafless when mature.

Erect. Branchlets numerous, terete. Racemes lax. Flowers $\frac{1}{3}$ in. 16. *C. compacta*.

Erect. Branchlets few, terete. Racemes dense. Flowers

$\frac{1}{8}$ in. 17. *C. curta*.

Erect or prostrate. Branchlets terete or compressed.

Racemes dense. Flowers $\frac{1}{10}$ – $\frac{1}{8}$ in. 18. *C. juncea*.

** Leafy when mature.

Prostrate. Branchlets compressed 19. *C. prona*.

1. *C. Enysii*, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 379, t. 30.—A much-dwarfed depressed excessively branched glabrous plant, forming dense patches 1–2 in. high; stems and lower branches thick and woody, matted. Branchlets small, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{25}$ – $\frac{1}{10}$ in. broad, erect or suberect, compressed, thin, striate. Leaves of young plants orbicular, emarginate. Flowers minute, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, solitary or in 3–6-flowered fascicles or racemes; pedicels slender, usually silky. Calyx campanulate; teeth short, acute. Standard with a narrow claw; wings as long as the keel. Pod $\frac{1}{5}$ – $\frac{1}{3}$ in. long, compressed, ovate-orbicular, often oblique, sometimes obliquely deltoid; replum incomplete; beak stout, broad at the base, recurved. Seed usually 1, rarely 2–3.—*Students' Fl.* 108.

Var. *orbiculata*, *Kirk, l.c.*—Larger and stouter, 2–4 in. high; branchlets $\frac{1}{6}$ in. broad. Pods with rugulose valves.—*C. orbiculata*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 459.

NORTH ISLAND: South-eastern base of Ruapehu, *Kirk!* Var. *orbiculata*: Rangipo Desert, *H. Hill!* *Kirk!* *Petrie!* SOUTH ISLAND: Broken River, *Enys!* *Kirk!* Ashburton Mountains, *Potts!* Maniototo Plain, *Petrie!* Var. *orbiculata*: Mount Ida, *Petrie!* 1500–3000 ft. December–January.

A most distinct and remarkable species, apparently rare and local. The pod dehisces by one of the valves separating from the replum down one side, but remaining attached at the tip and other side.

2. *C. uniflora*, *T. Kirk in Gard. Chron.* (1884) i. 512.—A much-dwarfed slender matted plant, forming large patches; stems often subterranean, putting out slender branches 1–2 in. high. Branchlets very narrow, $\frac{1}{10}$ – $\frac{1}{20}$ in., thin, compressed, glabrous, sometimes almost herbaceous. Leaves not seen. Flowers solitary, $\frac{1}{3}$ in. long, purplish-red; peduncles very long and slender, almost capillary, glabrous or puberulous, bracteolate about the middle. Calyx campanulate, glabrous or silky; teeth short, broad, acute. Standard broad, with a short broad claw; wings shorter than the keel. Pod $\frac{1}{3}$ – $\frac{1}{2}$ in. long, linear-oblong; valves slightly wrinkled; beak straight or oblique. Seeds 2–6.—*Kirk in Trans. N.Z. Inst.* xvi. (1884) 379; *Buch. l.c.* 394. *C. Suteri*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 383.

SOUTH ISLAND: Canterbury—Lake Grassmere, Lochnavar, Poulter River, *Enys!* Otira River, *Cockayne!* Mount Cook District, *Suter!* *T. F. C.* Otago—Waitaki Valley, *Buchanan!* Lake Hawea, *Petrie!* 1000–3000 ft. December–January. Probably not uncommon, but easily overlooked.

8. *C. nana*, *Col. ex Hook. f. Handb. N.Z. Fl.* 49.—A dwarf rigid glabrous plant, forming broad matted patches. Branchlets 2–4 in. long, $\frac{1}{6}$ – $\frac{1}{2}$ in. broad, thin, much flattened, strict, erect,

minutely grooved or striate. Leaves not seen. Racemes 2-4-flowered; pedicels long, very slender, glabrous or with a few silky hairs. Flowers $\frac{1}{3}$ – $\frac{1}{2}$ in. long, purplish-red. Calyx campanulate, usually silky; teeth short, broadly triangular, subacute. Standard broad, with a short broad claw; wings shorter than the keel. Pods $\frac{1}{3}$ – $\frac{1}{2}$ in. long, linear-oblong, often narrowed towards the base; beak short, straight. Seeds 2-6.—*Kirk, Students' Fl.* 109. *C. australis* *b nana*, *Benth. in Hook. f. Fl. Nov. Zel.* i. 50.

NORTH ISLAND: Elevated open country between Lake Taupo, Ngauruhoe, and Ruapehu. SOUTH ISLAND: Nelson to Central Otago, abundant in stony river-valleys. Altitudinal range from almost sea-level to 2800 ft. December-January.

One of the most widely spread species of the genus. Its nearest ally is *C. uniflora*, from which it is separated by the broader and more obtuse branchlets and racemed flowers.

4. **C. Monroi**, *Hook. f. Handb. N.Z. Fl.* 49.—A small excessively branched rigid and woody plant, forming low compact masses 6-24 in. diam. or more and 2-6 in. high. Branchlets crowded, very stout, flattened with rounded edges, grooved, $\frac{1}{8}$ – $\frac{1}{2}$ in. broad. Leaves only seen on young plants, cuneate or obcordate, emarginate, silky. Racemes 2-3-flowered, solitary or fascicled; pedicels long, slender, silky. Flowers $\frac{1}{3}$ in. long, purplish-red. Calyx silky, sometimes densely so; teeth long, narrow-triangular, acute. Standard longer than the keel, broad, emarginate; wings shorter than the keel. Pods $\frac{1}{3}$ – $\frac{2}{3}$ in. long, unusually turgid, straight or falcate; valves conspicuously wrinkled and corrugated when mature; beak short, usually oblique, sometimes straight. Seeds 4-14, brownish or reddish-brown mottled with darker.—*Kirk, Students' Fl.* 109. *C. corrugata*, *Col. in Trans. N.Z. Inst.* xv. (1883) 320.

SOUTH ISLAND: Dry gravelly places on the mountains, Marlborough to Otago, not uncommon. Altitudinal range from 250 ft. to fully 4000 ft. December-February.

A well-marked plant, easily distinguished by the depressed habit, short stout woody branchlets, lax racemes, and large remarkably turgid many-seeded pod.

5. **C. Williamsii**, *T. Kirk in Trans. N.Z. Inst.* xii. (1880) 394.—An erect much-branched shrub 3-8 ft. high. Branchlets $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, thin, much compressed, finely and closely striate or grooved, glabrous or slightly pubescent when young; notches distant, alternate. Leaves seldom produced except on young plants, 1-3-foliate; leaflets obovate or obcordate. Flowers large, $\frac{3}{4}$ –1 in. long, yellowish-red, pendulous, solitary or in 2-6-flowered fascicles or racemes; pedicels short, slender, silky. Calyx large, narrow-campanulate or almost tubular, pubescent; teeth linear-subulate, acute. Standard rather larger than the keel, sharply recurved one-third of the way from the base; wings narrow-oblong, falcate,

shorter than the keel. Pod $1-1\frac{1}{4}$ in. long, on stout erect pedicels, oblong, turgid; beak long, straight or oblique. Seeds 9-12, red mottled with black.—*Students' Fl.* 110.

NORTH ISLAND: Rare and local. East Cape district, from Te Kaha and Raukokore to Hicks Bay, *Bishop Williams! Petrie! Adams!* November-December.

A very distinct species. The broad thin branchlets, large flowers, and large turgid pod separate it from all others.

6. **C. australis**, *R. Br. in Bot. Reg.* xi. (1825) t. 912.—An erect much-branched glabrous usually leafless shrub 3-12 ft. high. Branchlets straight, often much elongated, $\frac{1}{10}-\frac{1}{3}$ in. broad, thin and flat, finely and closely striate; notches alternate, close or rather distant. Leaves seldom seen except on young plants, $\frac{3}{4}-2$ in. long, 1-foliolate or 3-5-foliolate; leaflets obcordate or obovate-cuneate, membranous, sessile. Racemes variable in length, 3-12-flowered, solitary or fascicled; pedicels puberulous or glabrous. Flowers crowded, small, $\frac{1}{8}-\frac{1}{6}$ in. long, pale-purplish. Calyx campanulate, teeth minute. Standard much broader than long, retuse, claw very short; keel equal in length or slightly shorter; wings oblong, almost as long as the keel. Pod oblong, compressed, $\frac{1}{3}-\frac{1}{2}$ in. long, suddenly narrowed into a short acute beak; valves slightly convex; replum stout, persistent long after the valves have fallen. Seeds 1-4, red, usually spotted with black.—*A. Cunn. Precur.* n. 574; *Hook. f. Fl. Nov. Zel.* i. 50; *Handb. N.Z. Fl.* 50; *Kirk, Students' Fl.* 110. *C. Cunninghamii*, *Raoul, Choix*, t. 28B. *Boissia scolopendrina*, *A. Rich. Fl. Nouv. Zel.* 346.

Var. **strictissima**, *Kirk, Students' Fl.* 110.—Branchlets $\frac{1}{4}-\frac{3}{8}$ in. broad. Racemes strict, many-flowered, dense. Pedicels very short. Pods not seen.

NORTH ISLAND: Abundant from the North Cape to Wanganui and Hawke's Bay. SOUTH ISLAND: Queen Charlotte Sound, *J. Rutland!* Var. **strictissima**: White Cliffs, Taranaki, *T. F. C.* Sea-level to 2800 ft. *Ma-kaka.* November-December.

7. **C. Petriei**, *T. Kirk, Students' Fl.* 111.—A stout sparingly branched shrub 1-6 ft. high, with rigid terete or subterete branches. Branchlets stout, $\frac{1}{12}-\frac{1}{8}$ in. diam., compressed at the tips, plano-convex or terete below, grooved or striate. Leaves not seen. Racemes laxly 3-8-flowered, solitary or many together, often forming dense fascicles; pedicels slender, and with the rachis silky-pubescent or almost villous. Flowers rather small, $\frac{1}{8}$ in. long. Calyx campanulate, silky; teeth short, broad, acute. Standard broader than long, exceeding the keel and wings. Ovary occasionally pubescent. Pods $\frac{1}{4}-\frac{1}{3}$ in. long, broadly oblong, turgid, oblique at the tip; valves thick, reticulated; beak short, stout. Seeds 1-4, usually 2-3.—*C. violacea*, *Kirk, l.c.* 112.

Var. **robusta**.—Pods longer, $\frac{1}{3}-\frac{1}{2}$ in., elliptic-oblong. Seeds 3-6. Other character much as in the type.—*C. robusta*, *Kirk, l.c.*

SOUTH ISLAND: Mount Cook district, *T. F. C.*; Central Otago, not uncommon, *Petrie*! Var. *robusta*: Nelson—Wairau Valley, *T. F. C.* Canterbury—Broken River basin, *Enys*! *Kirk*! *Petrie*! *T. F. C.*; Kowai River, *Petrie*!

The distinguishing characters of this species lie in its stout rigid habit, almost terete branchlets, numerous often fascicled racemes of rather small flowers, and the turgid pod. Mr. Kirk's *C. robusta* cannot be separated except by the longer and proportionately narrower pod with a larger number of seeds, and is best kept as a variety.

8. *C. subulata*, *T. Kirk*, *Students' Fl.* 112. — A slender erect often leafy glabrous shrub 1–3 ft. high, with almost terete branches. Branchlets $\frac{1}{20}$ – $\frac{1}{10}$ in. broad, compressed or plano-convex, strict and rigid, grooved or striated. Leaves 3-foliolate; leaflets oblong-obovate, retuse. Racemes laxly 3–6-flowered, one or several together; pedicels silky or almost glabrous, shorter than the flowers. Calyx campanulate; teeth minute, acute. Standard broader than long, about equal in length to the wings and keel. Pod $\frac{1}{4}$ – $\frac{3}{8}$ in. long, turgid, subulate, acuminate; beak short, stout, straight. Seeds 1–4, usually 2.

SOUTH ISLAND: Marlborough—Blenheim and Wakamarina, *Kirk*! Canterbury—Apparently not uncommon on the plains, *Kirk*! *Petrie*! *T. F. C.*; Akaroa, *Kirk*! Broken River, *Enys*! Otago—Near Dunedin, *Petrie*!

This appears to be characterized by the strict and slender sometimes almost filiform branchlets, small flowers, and turgid subulate pods. Herbarium specimens in flower alone are easily confounded with *C. flagelliformis*, but the pods are altogether different.

9. *C. virgata*, *T. Kirk*, *Students' Fl.* 112. — An erect rigid glabrous shrub 3–4 ft. high, branched from the base. Branchlets numerous, terete or plano-convex, grooved. Leaves not seen. Racemes few, 3–5-flowered, lax; pedicels and rachis glabrous or puberulous. Calyx campanulate, glabrous; teeth short, acute. Standard broader than long, equalling the wings and exceeding the keel. Pods (not quite ripe) $\frac{1}{3}$ in. long, oblong, turgid, narrowed below; beak short, straight, subulate. Seeds 1–3.

SOUTH ISLAND: Otago—*Petrie*; Southland, at Makarewa and Orepuki, *Kirk*!

I am only acquainted with this plant through a few imperfect specimens in Mr. Kirk's herbarium, and have therefore reproduced in its main features the description given in the "Students' Flora." Mr. Kirk remarks that it is "distinguished by the paucity of its racemes, small whitish flowers, and oblong pod narrowed at both ends." I fear that it is much too closely allied to *C. subulata*.

10. *C. diffusa*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 272. — A small erect or spreading glabrous much-branched shrub 1–2 ft. high. Branchlets slender, $\frac{1}{20}$ – $\frac{1}{15}$ in. wide, compressed or plano-convex or almost terete, striate. Leaves not seen. Racemes numerous, short, 3–6-flowered; pedicels shorter than the flowers. Calyx cup-shaped, mouth ciliolate; teeth minute, sometimes hardly evident

Pods very small, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, obliquely oblong, slightly narrowed at the base; valves slightly convex; beak short, stout, subulate.—*Kirk, Students' Fl.* 112.

SOUTH ISLAND: Canterbury—Near Lincoln, *Kirk*! Otago—*Buchanan*! Otepopo River, *Petrie*!

I have seen few specimens, and those by no means good, of this curious little species. It appears to have the habit of *C. flagelliformis* var. *corymbosa*, differing only in the smaller size and smaller pod, and will probably prove to be a form of that plant. Mr. Kirk's specimens from Dry River, Wellington, quoted in the "Students' Flora," are certainly referable to *C. flagelliformis*.

11. *C. grandiflora*, *Hook. f. Handb. N.Z. Fl.* 49.—An erect or spreading much-branched glabrous shrub 2–6 ft. high, usually leafy in spring and summer. Branchlets spreading or rarely fastigiate, $\frac{1}{2}$ – $\frac{1}{8}$ in. broad, compressed, deeply grooved. Leaves numerous, pinnately 3–5-foliolate; leaflets narrowly or broadly obcordate-cuneate, glabrous. Racemes $\frac{1}{3}$ –1 in. long, pedunculate, laxly 5–12-flowered; pedicels shorter than the calyx. Flowers white or pale-purple, $\frac{1}{4}$ in. long. Calyx large, campanulate; teeth acute, ciliolate or glabrous. Standard broader than long, exceeding the keel; wings as long as the keel. Pods oblong, $\frac{1}{4}$ – $\frac{3}{8}$ in. long, gradually narrowed into a rather long subulate beak; valves slightly convex. Seeds 2–4.—*Kirk, Students' Fl.* 110. *C. australis* var. *grandiflora*, *Benth. in Hook. f. Fl. Nov. Zel.* i. 50.

Var. *divaricata*, *Kirk, Students' Fl. l.c.*—Branches divaricating at right angles, flexuous, compressed at the tips, subterete below. Racemes slender, 5–15-flowered; flowers much smaller. Pod elliptic-oblong, narrowed at both ends; beak very short.

SOUTH ISLAND: Mountain districts from Nelson to Otago; most abundant on the western side. Var. *divaricata*: Upper Waimakariri district, at Mount White and the Poulter River, *Enys*! near Greymouth, *Helms*! Ascends to 3500 ft.; descends to sea-level in the West Coast sounds. December–January.

The chief characters of this variable plant are the leafy habit, glabrous deeply grooved branchlets, lax many-flowered racemes, comparatively large flowers, and small pod with slightly convex valves and rather long beak. It attains its greatest luxuriance in the moist river-valleys of Westland.

12. *C. odorata*, *Col. ex Hook. f. Fl. Nov. Zel.* i. 50.—A much-branched shrub 3–10 ft. high, leafy in spring and early summer. Branchlets $\frac{1}{20}$ – $\frac{1}{8}$ in. broad, distichous, slender, pendulous, compressed or plano-convex, grooved, pubescent towards the tips. Leaves very numerous, small, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, silky-pubescent, pinnately 3–7-foliolate; leaflets oblong-obcuneate or narrow-obovate, notched at the apex. Racemes slender, strict, erect (apparently drooping in herbarium specimens on account of the branches being pendulous), 10–20-flowered, pubescent, especially when young. Flowers small, $\frac{1}{8}$ – $\frac{1}{6}$ in. long. Calyx-teeth short, acute, ciliolate. Standard broader than long, about equalling the wings and keel. Ovary glabrous. Pod $\frac{1}{8}$ – $\frac{1}{4}$ in. long, obliquely ovate, abruptly nar-

rowed into a long stout subulate beak; valves flat or very slightly convex. Seeds 2, rarely more. — *Handb. N.Z. Fl.* 50; *Kirk, Students' Fl.* 113.

Var. ***pilosa***, *Kirk, l.c.*—Habit and flowers of *C. odorata*, but ovary silky, and pod hairy until nearly mature. — *C. pilosa*, *Col. ex Hook. f. Fl. Nov. Zel.* i. 50; *Handb. N.Z. Fl.* 49.

NORTH ISLAND: Ruahine Mountains to Cook Strait. SOUTH ISLAND: Pelorus Sound, *Kirk*! Nelson, *Monro*, *Travers*. Ascends to 2500 ft. November–January.

Separated from *C. grandiflora*, to which it is very closely allied, by the drooping slender pubescent branchlets, smaller flowers, and shorter flatter and broader pod with a longer beak. *C. pilosa* has not been gathered since its original discovery by Mr. Colenso, more than fifty years ago; but, judging from the description, it does not differ from *C. odorata* except in the pubescent ovary. This is a character which has been occasionally noted in several of the species, but which does not seem in itself to be sufficient for specific distinction.

13. ***C. angustata***, *T. Kirk, Students' Fl.* 114.—An erect glabrous shrub 1–3 ft. high, leafy in spring and summer; branches spreading, terete. Branchlets $\frac{1}{20}$ – $\frac{1}{12}$ in. broad, slender, filiform, sometimes compressed at the tips. Leaves glabrous, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, pinnately 3–5-foliolate; leaflets obcordate-cuneate, glaucous beneath. Flowers not seen. Fruiting racemes numerous, spreading or erect, slender, 1– $1\frac{1}{2}$ in. long. Pods 20–40, obliquely oblong, compressed, abruptly narrowed into a stout subulate beak. Seeds usually 2.

SOUTH ISLAND: Nelson—Plentiful in the Buller Valley, near the junction of the Lyell, *Kirk*!

I am only acquainted with this plant through the specimens in Mr. Kirk's herbarium. It will probably prove to be a variety of *C. odorata*, from which it only differs in the less compressed branchlets and in being glabrous. From *C. grandiflora* it can be distinguished by the more slender habit, terete branchlets, large leaves, and numerous flattened pods.

14. ***C. flagelliformis***, *Col. ex Hook. f. Fl. Nov. Zel.* i. 51.—A much-branched shrub 3–8 ft. high, very variable in habit; branches erect or spreading. Branchlets numerous, very slender, $\frac{1}{20}$ – $\frac{1}{10}$ in. broad, erect and fastigiate or spreading, sometimes drooping, compressed or plano-convex, grooved. Leaves of young plants 1– $1\frac{1}{2}$ in. long, pinnately 3–5-foliolate; leaflets oblong-cuneate, notched at the tip; of mature plants smaller, usually 3-foliolate. Racemes 1 or 2–3 together, laxly 3–7-flowered, often reduced to fascicles; pedicels usually pubescent. Flowers minute, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Calyx campanulate; teeth small, acute, ciliate. Standard very broad, retuse, about equalling the wings and longer than the keel. Pods solitary or several together, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, erect, compressed, obliquely oblong or ovate, sometimes nearly orbicular; beak long, stout, subulate. Seeds 1–4, usually 2.—*Handb. N.Z. Fl.* 50; *Kirk, Students' Fl.* 114. *C. australis*, *Raoul, Choix*, t. 28A

(non *R. Br.*). *C. multicaulis*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 329. *C. micrantha*, *Col. l.c.* xxvi. (1894) 313. *Lotus arboreus*, *Forst. Prodr.* n. 258.

Var. **corymbosa**, *Kirk, Students' Fl.* 114.—Branchlets slender, often flaccid and drooping, striate. Pod shorter, broadly oblong, much compressed, oblique; valves thin. Seed usually 1.—*C. corymbosa*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 80.

Var. **Hookeri**.—Smaller, 2–4 ft. Racemes very numerous, densely fascicled. Flowers larger, $\frac{1}{2}$ in. Pod ovate-oblong, less compressed; beak shorter.—*C. Hookeri*, *Kirk, l.c.* 115.

Var. **acuminata**.—Pods $\frac{1}{2}$ – $\frac{3}{4}$ in., broadest at the base, almost obpyriform, somewhat falcate, acuminate; beak oblique. Otherwise as in the type, but flowers not known.—*C. acuminata*, *Kirk, l.c.*

NORTH AND SOUTH ISLANDS: Not uncommon from the Upper Thames and Waikato southwards. Var. *corymbosa*: Hawke's Bay, *Colenso*! Var. *Hookeri*: South of Wellington Province, *Kirk*! Var. *acuminata*: Palliser Bay, *Kirk*! Sea-level to 3000 ft. November–January.

As a species *C. flagelliformis* is best distinguished by the slender grooved branchlets, minute flowers, which are either in open racemes or fascicled, and in the short broad pod, which is much compressed, and ends in a stout subulate beak sometimes $\frac{1}{10}$ in. long. In dry places it is usually leafless when adult, but frequently produces leaves in moist situations, or where shaded. Mr. Kirk's *C. Hookeri* appears to me to differ in no essential character; and his *C. acuminata* is founded on a single fruiting specimen, which altogether agrees with *C. flagelliformis* except for a slight difference in the shape of the pod.

15. **C. gracilis**, *Armstr. in Trans. N.Z. Inst.* xiii. (1880) 336.—A slender shrub 3–6 ft. high; stems weak, flexuous, terete, sparingly branched, often interlaced or scrambling over other bushes, more or less leafy, especially when growing in sheltered places. Branchlets almost filiform, grooved, silky or pilose. Leaves $\frac{1}{2}$ –1 in. long, pinnately 3–5-foliolate; petioles silky; leaflets $\frac{1}{6}$ – $\frac{1}{3}$ in., broadly obcordate, glabrous. Racemes loosely 2–6-flowered; pedicels slender, silky. Flowers rather large, $\frac{1}{3}$ – $\frac{1}{2}$ in. Calyx campanulate; teeth long and narrow, acute, silky within. Standard broad, 2-lobed, slightly longer than the keel. Pods $\frac{1}{2}$ in. long, elliptic, turgid; replum thick; beak very long, straight, stout, subulate. Seeds 2.—*C. Kirkii*, *Hook. f. in Ic. Plant.* t. 1332; *Kirk, Students' Fl.* 113.

SOUTH ISLAND: Canterbury—Vicinity of Christchurch, *Armstrong*! *Haast*! *Cockayne*! Otago—Cardrona Valley, *Kirk*! Otepopo River, Sowburn, *Petrie*! Sea-level to 1500 ft. November–December.

A distinct species, at once recognised by the weak terete stems, large flowers, and large turgid pod with a long almost pungent beak.

16. **C. compacta**, *Petrie in Trans. N.Z. Inst.* xvii. (1885) 272.—An erect much and closely branched shrub 2–4 ft. high. Branchlets numerous, strict, erect, $\frac{1}{15}$ – $\frac{1}{10}$ in. diam., terete or nearly so, striate. Leaves not seen. Racemes $\frac{1}{2}$ – $\frac{3}{4}$ in. long, numerous, lax, pedunculate, 3–8-flowered; pedicels slender, glabrous, usually longer than the flowers. Flowers $\frac{1}{2}$ in. long, pinkish-white,

fragrant. Calyx somewhat tumid, campanulate, glabrous; teeth shallow, acute. Standard broader than long, 2-lobed, about equalling the wings; keel-petals much shorter, broad above, claws long. Pod $\frac{1}{8}$ – $\frac{1}{5}$ in. long, indehiscent, obovoid, turgid, compressed from back to front so that the width is greater than the depth; valves reticulate; beak short, subulate, oblique or recurved. Seeds 1–2.—*Huttonella compacta*, *Kirk, Students' Fl.* 115.

SOUTH ISLAND: Otago—Clutha Valley, between Lake Wakatipu and Clyde, *Petrie!* November–December.

This can be distinguished from the other species of the section *Huttonella* by the crowded terete branchlets, long and lax racemes of rather large flowers, and the larger pod.

17. *C. curta*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 271.—An erect sparingly branched glabrous shrub 1–2 ft. high. Branchlets $\frac{1}{20}$ – $\frac{1}{15}$ in. broad, slender, terete or nearly so, subcompressed at the tips, grooved or striate. Leaves not seen. Racemes variable in length, distant, 6–10-flowered; rachis elongating after flowering; pedicels short, silky. Flowers $\frac{1}{8}$ in. long. Calyx more or less pubescent, campanulate; teeth short, acute. Standard broader than long, retuse, exceeding the wings; keel with a short claw. Ovary silky. Pod $\frac{1}{8}$ – $\frac{1}{5}$ in. long, pendulous, turgid, oblong-obovoid, glabrous when mature; valves thin; beak slender, curved upwards. Seeds 2–3.—*Huttonella curta*, *Kirk, Students' Fl.* 116.

SOUTH ISLAND: Otago—Waitaki Valley, at Duntroon and Kurow, *Petrie!*

Allied to *C. juncea*, but separated by the longer distant racemes, larger flowers, and larger pod. In none of the flowers which I have examined could I find the callosity on the wings mentioned by Mr. Kirk.

18. *C. juncea*, *Col. ex Hook. f. Fl. Nov. Zel.* i. 51.—An erect or rarely prostrate glabrous branching shrub 1–2 ft. high. Branchlets very slender, $\frac{1}{25}$ – $\frac{1}{15}$ in. broad, compressed or almost terete, grooved. Leaves not seen. Racemes short, often fascicled, 2–8-flowered; pedicels pubescent, rather longer than the calyx. Flowers minute, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Calyx campanulate, silky; teeth very small, acute. Standard broader than long, slightly exceeding the keel; wings narrow, somewhat shorter. Pod usually indehiscent, very small, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, oblong or ovoid-oblong, turgid or almost inflated; valves thin and membranous; beak slender, curved or sharply bent. Seeds 1–2, rarely 3.—*Handb. N.Z. Fl.* 50. *Huttonella juncea*, *Kirk, Students' Fl.* 116.

NORTH ISLAND: East Cape, *Sinclair*; Hawke's Bay and Taupo, *Colenso*! Rotorua, *Kirk*. SOUTH ISLAND: Akaroa, *Raoul*; Canterbury Plains, *Haast*. Otago—Waitaki Valley, Maniototo Plains, Lake District, *Petrie!*

Apparently rare and local. The only North Island specimens I have seen are Mr. Colenso's, collected many years ago, and which must be taken as the type of the species. Those from Otago, in Mr. Petrie's herbarium, differ in the stouter and more strict branches and rather longer pods, the beak of

which is abruptly bent, forming almost a right angle with the pod. It is possible that two species are confounded under the name of *C. juncea*, as Mr. Kirk has suggested; but more complete sets of specimens are required to settle the matter.

19. **C. prona**, Kirk in *Trans. N.Z. Inst.* xxvii. (1895) 350.—A small much-branched prostrate shrub; stems and branches closely appressed to the ground, 4–12 in. long, rarely more. Branchlets $\frac{1}{20}$ – $\frac{1}{12}$ in. diam., compressed, grooved. Leaves often numerous, 1-foliate or pinnately 3–5-foliate, silky; terminal leaflet much larger than the rest, oblong or oblong-obovate, cuneate at the base, deeply retuse at the tip. Racemes small, 3–7-flowered; pedicels short, silky. Flowers minute, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Calyx campanulate; teeth acute. Standard broader than long, retuse; wings shorter than the keel. Pod $\frac{1}{8}$ in. long, broadly oblong, turgid; valves thin; beak short, abruptly turned upwards. Seed solitary.—*Huttonella prona*, Kirk, *Students' Fl.* 116.

SOUTH ISLAND: Canterbury—Lake Lyndon, altitude 2800 ft., *J. D. Enys*! *Kirk*! *Cockayne*! *T. F. C.* December–January.

The leafy prostrate habit and flattened branches distinguish this species from its allies.

3. NOTOSPARTIUM, Hook. f.

Leafless shrubs with slender much-compressed pendulous branchlets. Flowers rather small, in lateral racemes. Calyx campanulate, 5-toothed; teeth short, about equal. Standard obovate-obcordate, narrowed into a short claw, shortly reflexed; wings oblong, shorter than the keel, with an incurved auricle at the base; keel hatchet-shaped, obtuse. Upper stamen free, remainder connate into a sheath. Ovary sessile or nearly so, linear; ovules numerous; style incurved. Pod shortly stipitate, linear, straight or falcate, compressed, 3–10-jointed, membranous, indehiscent; beak short. Seeds 1 to each joint, oblong; radicle twisted, with a double flexure.

A genus of 2 closely allied species, both confined to New Zealand. It has the leafless habit and compressed branchlets of *Carmichaelia*, but differs in the linear many-jointed pod, and in other respects.

Flowers pink. Pods $\frac{3}{4}$ –1½ in. long, $\frac{1}{8}$ in. wide, straight ..	1. <i>N. Carmichaeliæ</i> .
Flowers purple. Pods $\frac{3}{4}$ –1 in. long, $\frac{1}{15}$ in. wide, falcate,	
torulose	2. <i>N. torulosum</i> .

1. **N. Carmichaeliæ**, Hook. f. *Handb. N.Z. Fl.* 51.—A slender much-branched shrub 4–10 ft. high. Branchlets $\frac{1}{20}$ – $\frac{1}{10}$ in. broad, glabrous, compressed, grooved, with distant alternate scales. Leaves only seen on young plants, 1-foliate, obcordate or orbicular, entire or emarginate, sometimes mucronate. Racemes 1–2 in. long, 8–20-flowered; pedicels longer than the calyces, and with the rachis silky-pubescent. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. long, pink. Calyx silky; teeth

short, triangular. Pod $\frac{3}{4}$ –1 in. long, linear, 3–8-jointed. Seeds 1 to each joint, orbicular-reniform.—*Bot. Mag.* t. 6741; *Kirk, Student's Fl.* 117.

SOUTH ISLAND: Rare and local. Marlborough—Waihopai River, *Monro*; Upper Awatere, *Sinclair*; Kaikoura Mountains, *Buchanan*! Medway Creek, *Kirk*! Nelson—Mount Fyffe, *Rev. F. H. Spencer*; Amuri, *J. B. Armstrong*! 800–2000 ft. *Pink broom.* December–January.

2. *N. torulosum*, *T. Kirk, Students' Fl.* 117.—A much-branched glabrous shrub 4–8 ft. high; branches flexuous or trailing in young plants, pendulous in the mature state. Branchlets $\frac{1}{20}$ – $\frac{1}{15}$ in. diam., slender, strict, terete or slightly compressed at the tips, grooved. Leaves only seen in young plants, 1-foliolate, broadly oblong or obovate to orbicular, emarginate. Racemes 1–2 in. long, strict, glabrous, 3–10-flowered; pedicels barely longer than the calyx. Calyx campanulate, glabrous; teeth broad, sub-acute. Standard narrower than in *N. carmichaelia*, reflexed; wings exceeding the keel. Pod $\frac{3}{4}$ –1 in. long, $\frac{1}{15}$ in. wide, falcate, compressed, about 8–10-jointed; joints swollen. Seeds 1 to each joint, reniform, compressed.

SOUTH ISLAND: Nelson—Gorge of the Mason River, *Haast*! *Rev. F. H. Spencer*, *S. D. Barker*, *Cockayne*! Whale's Back, *Cockayne*. Canterbury—Mount Peel and Waikari, *Barker*.

The only specimens I have seen of this curious plant are two fragmentary ones past flowering in Mr. Kirk's herbarium, and some fruiting specimens in Mr. Petrie's, collected by Mr. Cockayne. Better material is required before a good description can be prepared.

4. *CLIANTHUS*, Banks and Sol.

Glabrous or villous herbs or undershrubs, usually woody below; branches weak, ascending or spreading, sometimes almost climbing. Leaves pinnate; leaflets numerous. Flowers large, red, in pendulous racemes. Calyx campanulate, 5-toothed. Standard acuminate, sharply reflexed over the calyx; wings much shorter, lanceolate or oblong; keel equalling the standard, boat-shaped, incurved, acute. Ovary stipitate; ovules numerous; style subulate, incurved, bearded below the apex. Pod terete, narrow-oblong, turgid, beaked. Seeds numerous, reniform.

Besides the New Zealand species, which is endemic, there is one from Australia, and another (perhaps not truly congeneric) from the island of Ceram.

1. *C. puniceus*, *Banks and Sol. ex Lindl. in Trans. Hort. Soc. Ser. ii.* (1835) 521.—A very handsome much-branched undershrub 3–6 ft. high, more or less clothed with appressed silky pubescence; branches spreading, younger ones succulent, almost herbaceous. Leaves 3–6 in. long, unequally pinnate; leaflets 8–14 pairs, $\frac{1}{2}$ –1 in. long, sessile, linear-oblong, obtuse or retuse. Racemes 6–15-flowered, pendulous. Flowers bright-scarlet, 2–3 in. long. Standard ovate, acuminate; wings lanceolate, falcate, acute, less than half

the length of the keel; keel large, falcate, acuminate. Pods 2-3 in. long, turgid, many-seeded.—*Lindl. in Bot. Reg.* t. 1775; *A. Cunn. Precur.* 572; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 49; *Handb. N.Z. Fl.* 52; *Kirk, Students' Fl.* 118. *Donia punicea*, *Don. Syst.* ii. 468.

Var. **maximus**, *Kirk, l.c.*—Leaflets larger, sometimes $1\frac{1}{2}$ in. long. Flowers rather smaller. Standard broadly ovate, acuminate, often with a dark spot at the base; wings oblong, broad, rounded at the apex.—*C. maximus*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 294.

NORTH ISLAND: Exceedingly rare and local in a wild state, and fast becoming extinct. Small islets in the Bay of Islands, *Colenso*; Great Barrier Island, *Kirk*; Mercury Bay, *Banks and Solander*; several localities in the East Cape district, *Banks and Solander*! *Bishop Williams*! Waimarama, *Nairn*. Formerly cultivated by the Maoris in many localities on the shores of the North Island. *Kowhai-ngutu-kaka*. August–November.

The brilliancy of the flowers renders this plant a universal favourite, and it is now commonly cultivated in gardens throughout the colony under the name of “red kowhai.” I agree with Mr. Kirk in considering that Mr. Colenso's *C. maximus* is not entitled to the rank of a species.

5. SWAINSONA, Salisb.

Herbs or undershrubs. Stems erect or prostrate, sometimes climbing. Leaves unequally pinnate; leaflets usually numerous. Flowers in axillary racemes. Calyx campanulate, 5-toothed; teeth nearly equal. Standard orbicular or reniform, spreading or reflexed, shortly clawed; wings oblong, falcate or slightly twisted; keel broad, incurved, obtuse or produced into a twisted beak. Upper stamen free; remainder connate into a sheath. Ovary sessile or stalked; ovules numerous; style slender, incurved, bearded along the inner edge. Pod ovoid or oblong, turgid or inflated, membranous or coriaceous, 2-valved or almost indehiscent. Seeds several, small, usually reniform.

With the exception of the following species, which is endemic in New Zealand, the genus is confined to Australia. It is very closely allied to the northern genera *Colutea* and *Astragalus*.

1. **S. novæ-zealandiæ**, *Hook. f. Handb. N.Z. Fl.* 51.—A small herbaceous perennial 2-4 in. high, more or less clothed with silky pubescence. Rhizome creeping, slender. Stems numerous, erect or spreading, branched above. Leaves 1-2 in. long; leaflets 6-8 pairs, $\frac{1}{4}$ in. long, opposite, oblong or narrow-obovate, obtuse or retuse, sessile. Stipules broadly ovate, obtuse. Racemes 3-8-flowered, on stout peduncles longer or shorter than the leaves; pedicels not equalling the calyx, bracteolate at the base. Flowers purplish, $\frac{1}{3}$ in. long. Calyx silky-hairy, with linear teeth as long as the tube, 2-bracteolate at the base. Pod large, inflated, 1 in. long, acute at both ends; valves thin, coriaceous. Seeds 5-10, small.—*Kirk, Students' Fl.* 118.

SOUTH ISLAND: Nelson—Mountains flanking the Clarence Valley, *Travers*, *T. F. C.* Marlborough—Kaikoura Mountains, *Buchanan*! Canterbury—Kowai River, *Haast*! Coleridge Pass, *Enys*! *Kirk*! Otago—Mount St. Bathans, *Petrie*! 2000-5000 ft. December-January.

6. CANAVALIA, D.C.

Climbing or prostrate herbs, often of large size. Leaves 3-foliate, stipellate. Flowers rather large, in axillary racemes. Calyx-limb 2-lipped; the upper lip large and projecting, entire or 2-lobed; the lower shortly 3-toothed. Standard broad, reflexed; wings shorter, oblong or linear, falcate or twisted; keel incurved, obtuse or obtusely rostrate. Stamens all connate into a tube; anthers uniform. Ovary shortly stipitate; ovules numerous; style filiform, beardless; stigma terminal. Pod large, oblong or linear, 2-valved, with a distinct rib on each valve near the upper suture. Seeds rounded or oblong, compressed; hilum linear.

Species about 12; 2 or 3 of them, including the New Zealand one, widely spread in the tropics, the remainder mostly American.

1. *C. obtusifolia*, *D.C. Prodr.* ii. 404.—Stems long, trailing, glabrous or the young shoots silky-pubescent. Leaflets 2-4 in. long, broadly obovate or orbicular, obtuse or emarginate, texture firm. Racemes few-flowered, on stout erect peduncles 6-10 in. long, usually overtopping the leaves. Flowers pinkish. Standard orbicular, $\frac{3}{4}$ in. diam. Pod 4-5 in. long by 1 in. broad, the longitudinal wings very narrow. Seeds 2-8.—*Benth. Fl. Austral.* ii. 256; *Kirk, Students' Fl.* 121.

KERMADEC ISLANDS: Scrambling over rocks and shrubs on Meyer Island, *T. F. C.* A common plant on the shores of almost all tropical countries.

7. SOPHORA, Linn.

Small trees or shrubs. Leaves imparipinnate. Flowers in racemes or panicles, large, showy. Calyx oblique, broadly campanulate; teeth very short. Standard broadly obovate or orbicular, erect or spreading; wings oblong, oblique, shorter than the keel. Stamens 10, free or rarely obscurely connate at the base; anthers versatile. Ovary shortly stipitate; ovules numerous; style incurved; stigma minute, terminal. Pod moniliform, elongated, terete or 4-winged or -angled, fleshy or coriaceous or woody, indehiscent or 2-valved, each seed enclosed in a separate cell. Seeds oblong to globose, few or many.

Species about 22, found in most warm countries. The New Zealand species belongs to the section *Edwardsia*, characterized by the short standard, exserted stamens, and 4-winged pod.

1. *S. tetraptera*, *J. Mull. Ic. Plant.* t. 1.—A very variable shrub or small tree 15-40 ft. high, with a trunk 6-24 in. diam.; branches of young trees slender, flexuous, often interlaced; young shoots, leaves, inflorescence, and calyces more or less clothed with silky

fulvous pubescence. Leaves exstipulate, 1-6 in. long; pinnae 4-40 pairs, sessile or shortly petiolulate, $\frac{1}{4}$ -1 in. long, linear-oblong to obcordate or orbicular, rounded or retuse at the tip. Racemes 2-8-flowered, pendulous. Flowers large, golden-yellow, 1-2 in. long. Calyx gibbous, hemispherical, mouth oblique. Standard hardly reflexed, broadly obovate, obtuse; keel and wings oblong. Pod 2-8 in. long, moniliform, 4-angled, and with 4 narrow longitudinal wings; valves hardly dehiscent. Seeds 3-8, oblong.—*Forst. Prodr.* n. 183; *Hook. f. Handb. N.Z. Fl.* 53; *Kirk, Students' Fl.* 129.

Var. **grandiflora**, *Hook. f. Handb. N.Z. Fl.* 53.—Leaflets 10-25 pairs, longer and narrower, linear-oblong. Flowers larger, 2 in. long. Standard a fourth shorter than the wings, obviously reflexed.—*Kirk, Forest Fl.* t. 50. *S. tetra ptera*, *Bot. Mag. t.* 167. *Edwardsia grandiflora*, *Salisb. in Trans. Linn. Soc. ix.* (1808) 299; *A. Rich. Fl. Nouv. Zel.* 344; *A. Cunn. Precur. n.* 571; *Hook. f. Fl. Nov. Zel. i.* 52.

Var. **microphylla**, *Hook. f. Handb. N.Z. Fl.* 53.—Leaflets 25-40 pairs, small, oblong or obovate to orbicular. Flowers 1-1 $\frac{1}{2}$ in. Standard narrower, as long as the wings or nearly so, hardly reflexed.—*Kirk, Forest Fl.* t. 51. *S. microphylla*, *Ait. Hort. Kew. ii.* 43; *Bot. Mag. t.* 1442. *S. Chathamica*, *Cockayne in Trans. N.Z. Inst. xxxiv.* (1902) 319 (name only). *Edwardsia microphylla*, *Salisb. in Trans. Linn. Soc. ix.* (1808) 299; *A. Rich. Fl. Nouv. Zel.* 344; *A. Cunn. Precur. n.* 570. *E. Macnabiana*, *Bot. Mag. t.* 3735. *E. grandiflora* var. *microphylla*, *Hook. f. Fl. Nov. Zel. i.* 52.

Var. **prostrata**, *Kirk, Forest Fl. t.* 52.—Stems prostrate. Leaflets 2-4 pairs. Flowers small, solitary or in pairs. Standard hardly shorter than the wings. Pods small, downy, barely winged; seeds 1-3.—*S. prostrata*, *Buch. in Trans. N.Z. Inst. xvi.* (1884) 395, t. 36.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Var. *microphylla*: Abundant from the North Cape to Southland. Var. *grandiflora*: From the East Cape to Wellington, and reported from the South Island, but I have seen no specimens from thence. Var. *prostrata*: Mountains of Marlborough and Canterbury. Sea-level to 2500 ft. *Kowhai*. August-October. Also found in Lord Howe Island, Easter Island, Juan Fernandez, and Chili.

The three varieties described above have a very distinct appearance, and many botanists will prefer to treat them as separate species. The timber is hard, strong, and durable, but can rarely be obtained of sufficient size for economic purposes.

ORDER XXIII. ROSACEÆ.

Herbs, shrubs, or trees. Leaves simple or compound, alternate or rarely opposite, stipulate. Flowers usually regular and hermaphrodite, sometimes unisexual. Calyx with the tube free or adnate to the ovary, limb 4-5-lobed, lobes imbricate or valvate. Petals 4-5, rarely wanting, free, inserted on the calyx at the base of the lobes, imbricate. Stamens many, rarely few, inserted on the calyx just within the petals; filaments subulate, often incurved in bud; anthers small, didymous. Ovary of 1 or more free or coherent 1-celled carpels, sometimes adnate to the calyx-tube; styles free or connate; ovules 1 or 2 to each carpel, anatropous. Fruit very various, superior, or more or less inferior and combined

with the calyx-tube, of one or many achenes, drupes, or follicles, or a pome, more rarely a berry or capsule. Seeds erect or pendulous, albumen generally wanting; embryo with large plano-convex cotyledons and a stout radicle.

A large order, found all over the world, but most abundant in the temperate and colder parts of the Northern Hemisphere; comparatively rare in the tropics and in the south temperate zone. Genera about 75; species from 1200 to 1500. It includes most of the important cultivated fruits of northern origin, as peaches, plums, apricots, cherries, apples, pears, strawberries, raspberries, &c.; as well as the rose, with its numberless garden varieties. Of the 4 New Zealand genera, *Acæna* is mainly South American, but extends northwards to California and south-eastwards to Australia and New Zealand; the 3 others are widely spread in temperate regions. Many northern species have established themselves in New Zealand, as will be seen on referring to the list of introduced plants given in the appendix.

Scrambling or climbing shrubs with prickly stems. Fruit of many crowded succulent carpels	1. RUBUS.
Herbs with pinnately lobed or divided leaves. Styles elongating after flowering. Fruit-carpels numerous, dry	2. GEUM.
Herbs with pinnate leaves. Styles not elongating after flowering. Fruit-carpels numerous, dry	3. POTENTILLA.
Herbs with pinnate leaves. Fruiting-calyx usually with stiff bristles, often barbed at the top. Carpels 1, rarely 2	4. ACÆNA.

1. RUBUS, Linn.

Scrambling or climbing shrubs, rarely herbs, almost always prickly. Leaves alternate, simple or compound, usually palmately or pinnately divided into 3-5 lobes or segments or separate leaflets; stipules adnate to the petiole. Flowers in terminal or axillary panicles, rarely solitary. Calyx-tube broad, open; lobes 5, persistent. Petals 5. Stamens numerous. Disc coating the calyx-tube. Carpels many, seated on a convex receptacle; style subterminal; ovules 2, pendulous. Fruit composed of many succulent 1-seeded drupes, crowded upon an oblong or conical dry receptacle. Seed pendulous.

A large genus, common in the temperate portions of the Northern Hemisphere, rarer in the tropics and south temperate zone. The fruits of all the species are edible, and some of them, such as the raspberry and blackberry, both of which have become naturalised in New Zealand, are excellent. All the New Zealand species are endemic.

* Leaves 3-5-foliolate.

A lofty climber. Leaflets glabrous, cordate or truncate at the base. Panicles large. Flowers white	1. <i>R. australis</i> .
Climbing or scrambling, often forming a dense bush. Leaflets glabrous, rounded or cuneate at the base. Panicles small. Flowers yellowish	2. <i>R. cissoides</i> .
Climbing or scrambling, often forming a dense bush. Leaflets often tomentose beneath, broadly ovate. Fruit large, yellowish	3. <i>R. schmidelioides</i>

** Leaves 1-foliolate.

Small, prostrate. Leaves sharply dentate. Fruit very
large 4. *R. parvus*.

1. *R. australis*, *Forst. Prodr.* 224.—A tall climber, reaching the tops of the highest trees; stems stout, woody at the base; branches slender, drooping, armed with scattered recurved prickles. Leaves 3–5-foliolate or rarely pinnate with 2 pairs of leaflets and a terminal one; leaflets coriaceous, glabrous, very variable in size and shape, 2–5 in. long, ovate-oblong or ovate-lanceolate to linear-oblong or almost linear, acute or acuminate, truncate or cordate at the base, sharply serrate; petioles and midribs armed with recurved prickles. Panicles large, much branched, 6–24 in. long, leafy towards the base; pedicels short, glandular or pubescent. Flowers white, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., diœcious; males larger and more conspicuous than the females. Petals broadly ovate or oblong. Fruit $\frac{1}{4}$ in. diam., reddish-orange.—*A. Rich. Fl. Nouv. Zel.* 340; *A. Cunn. Precur.* n. 567; *Raoul, Choix*, 49; *Kirk, Students' Fl.* 125. *R. australis* var. *glaber*, *Hook. f. Fl. Nov. Zel.* i. 53, t. 14; *Handb. N.Z. Fl.* 54.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Ascends to 2800 ft. *Tataramoa*; *Bush-lawyer*. September–October.

Distinguished from the other species by its large size, glabrous leaflets cordate or truncate at the base, large panicles, white flowers, and small red fruit.

2. *R. cissoides*, *A. Cunn. Precur.* n. 569. — A scrambling or climbing shrub; branchlets slender, unarmed, usually much and closely interlaced, forming a dense bush. Leaves 3–5-foliolate; leaflets 2–5 in. long, narrow-ovate to lanceolate or linear-lanceolate, acuminate, rounded or cuneate at the base, sharply and irregularly serrate or lobed; petioles varying much in length, furnished with fewer and softer prickles than in *R. australis*. Panicles 2–6 in. long, often reduced to racemes; pedicels pubescent or glabrate. Flowers yellowish-white, $\frac{1}{3}$ in. diam., diœcious. Calyx-lobes broadly ovate, tomentose. Petals linear-oblong. Fruit orange-red, much as in *R. australis*.—*Raoul, Choix*, 49; *Kirk, Students' Handb.* 126. *R. australis* var. *cissoides*, *Hook. f. Fl. Nov. Zel.* i. 53; *Handb. N.Z. Fl.* 54.

Var. *pauperatus*, *Kirk, l.c.*—Leaves reduced to prickly midribs, sometimes with a minute leaflet at the apex.—*R. squarrosus*, *Kerner*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the North Cape southwards, chiefly in lowland districts. September–November.

3. *R. schmidelioides*, *A. Cunn. Precur.* n. 568.—A scrambling or climbing shrub; branchlets usually unarmed, often intertwined, forming a dense bush; young shoots pubescent or tomentose. Leaves 3–5-foliolate; leaflets 2–4 in. long, orbicular-ovate or ovate-oblong to ovate-lanceolate, coriaceous, acute, rounded or cordate at

the base, coarsely and irregularly toothed, usually tomentose or pubescent beneath; petioles and midribs with recurved prickles. Panicles 2–8 in. long; branches and pedicels stout, hispid or setose or pubescent. Flowers $\frac{1}{3}$ in. diam., whitish, diœcious. Calyx tomentose. Petals broad, rounded. Fruit $\frac{1}{3}$ in. diam., pale-yellowish, juicy.—*Raoul, Choix*, 49; *Kirk, Students' Fl.* 126. *R. australis* var. *schmidelioides*, *Hook. f. Fl. Nov. Zel.* i. 53; *Handb. N.Z. Fl.* 54.

Var. **coloratus**, *Kirk, l.c.*—Leaflets rugose, white beneath with appressed tomentum,

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon throughout, but mostly in lowland districts. October–November.

4. **R. parvus**, *Buch. in Trans. N.Z. Inst.* vi. (1874) 243, t. 22, f. 2 and 3.—A dwarf prostrate glabrous shrub; stems creeping, 12–18 in. long, sometimes partly buried in the soil and rooting at the nodes; bark red; prickles few. Leaves 1-foliolate; leaflets bronzy, coriaceous, 1–3 in. long, linear or linear-lanceolate, acute, slightly cordate or truncate at the base, acutely dentate; teeth almost spinous; petioles and midrib with a few stout prickles. Flowers few, diœcious, in short terminal or axillary panicles or solitary; pedicels pubescent. Calyx-lobes silky-pubescent, acuminate, reflexed. Petals white, barely exceeding the calyx. Fruit large, $\frac{1}{2}$ –1 in. long, oblong, juicy.—*Kirk, Students' Fl.* 126.

SOUTH ISLAND: River-valleys on the western side of the Southern Alps. Heaphy River, *Dall*; Buller Valley, *Kirk*; Lyell River, *Dr. Gaze*; Lake Brunner, *Hector*! Teremakau Valley, *Kirk*! Otira Valley, *Cockayne*! *Petrie*! Altitudinal range 250–3000 ft.

Apparently a very distinct species, easily recognised by its small size, 1-foliolate leaves with sharply dentate margins, long acuminate sepals, and large oblong fruit. I cannot agree with Mr. Kirk in thinking that it may be “an arrested form of *R. australis*.”

2. **GEUM**, Linn.

Perennial herbs. Radical leaves crowded, often rosulate, pinnate or pinnatisect; leaflets toothed or incised, the terminal one often much larger than the others; stem-leaves usually small and bract-like. Flowers in a terminal corymbose panicle or solitary. Calyx persistent; lobes 5, usually alternating with 5 bracteoles. Petals 5. Stamens numerous, crowded. Carpels many; ovules solitary, erect; style terminal, filiform, elongating much after flowering, bent at or below the end. Achenes numerous, compressed, crowded on a dry receptacle, each one terminated by the persistent elongated naked or plumose style.

A genus comprising about 35 species, spread through the temperate and cold regions of both the Northern and Southern Hemispheres. One of the New Zealand species is widely distributed, another occurs in temperate South America, the rest are endemic.

* Achenes villous. Flowers white except in 1.

- | | |
|--|----------------------------|
| Stem leafy, 2-3 ft. high. Flowers yellow | 1. <i>G. urbanum</i> . |
| Leaves chiefly radical, 3-5 in. long. Panicles few-flowered. | |
| Styles longer than the achenes | 2. <i>G. parviflorum</i> . |
| Leaves all radical, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. Flowers small, in 3-5-flowered racemes. Styles shorter than the achenes | 3. <i>G. sericeum</i> . |
| Leaves all radical, 1-3 in. Flowers solitary, large, $\frac{3}{4}$ in. diam. Styles long | 4. <i>G. uniflorum</i> . |

** Achenes glabrous. Flowers small, white.

- | | |
|--|----------------------------|
| 3-6 in. high. Flowers in cymose panicles | 5. <i>G. leiospermum</i> . |
| 1-2 in. high. Flowers solitary | 6. <i>G. pusillum</i> . |

G. alpinum, Buch. in Trans. N.Z. Inst. xix. (1887) 216, is quite unknown to me, and there are no specimens in his herbarium. The original description is vague and insufficient, and the name had far better be dropped.

1. *G. urbanum*, Linn. *Sp. Plant.* n. 501, var. *strictum*.—An erect sparingly branched herb 1-3 ft. high, usually softly pubescent or villous in all its parts. Radical leaves very variable in size, 4-18 in. long including the petiole, pinnate; leaflets 3-5 pairs with much smaller ones intermixed, 1-3 in. long, ovate or obovate, cuneate at the base, sessile, variously toothed lobed or pinnatifid. Cauline leaves few, smaller, with fewer and more sharply toothed leaflets, sessile or nearly so; stipules leafy, coarsely toothed or lobed. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., yellow, few together in a loose terminal panicle; peduncles slender, erect. Calyx-lobes ovate, acuminate, reflexed in fruit. Petals obovate, exceeding the calyx. Achenes very numerous, forming a dense oblong head, spreading and recurved, hispid with long silky hairs; awn long, hooked at the tip.—*Hook. f. Handb. N.Z. Fl.* 55; *Kirk, Students' Fl.* 128. *G. magellanicum*, *Comm. ex Pers. Syn.* ii. 57; *Hook. f. Fl. Nov. Zel.* i. 55.

NORTH AND SOUTH ISLANDS: Not uncommon from the Paparata Valley and Waikato River southward. Sea-level to nearly 3000 ft. November-January.

The New Zealand variety has a wide distribution in the Southern Hemisphere, and is found in some parts of Asia as well. It differs from the European *G. urbanum* principally in the taller and more robust habit and larger flowers.

2. *G. parviflorum*, Sm. in *Rees Cyclop.* v. n. 12.—An erect or spreading perennial herb 4-18 in. high, everywhere clothed with silky or villous hairs, sometimes almost shaggy; rootstock stout, woody. Radical leaves 2-5 in. long, pinnate; terminal leaflet very large, $\frac{3}{4}$ -2 in. diam., rounded-reniform, obscurely 3-5-lobed, crenate, hairy on both surfaces; lateral leaflets 4-8 pairs, all minute, deeply cut and lobed. Cauline leaves or bracts few, small, deeply toothed. Panicles lax, few-flowered; pedicels long, slender. Flowers $\frac{1}{2}$ in. diam., white. Calyx-lobes broadly ovate, obtuse or subacute. Petals broad, obtuse, longer than the calyx. Achenes very numerous, spreading, stipitate, clavate, villous; style slender,

straight, villous below, glabrous and hooked at the tip, much longer than the achene.—*Hook. f. Fl. Antarct.* ii. 263; *Fl. Nov. Zel.* i. 56; *Handb. N.Z. Fl.* 55; *Kirk, Students' Fl.* 129.

NORTH AND SOUTH ISLANDS: In hilly and mountain districts, from Mount Hikurangi and the Ruahine Range southwards. 1500–5000 ft. December–February. Also in South America, from Chili to Fuegia.

3. *G. sericeum*, *T. Kirk, Students' Fl.* 129.—“Pubescent, silky or villous in all its parts. Leaves all radical, $\frac{3}{4}$ –1 in. long including the petiole; terminal segment orbicular-cordate or reniform, minutely lobed or crenate-toothed, pubescent and rugose beneath, silky above; lateral leaflets minute or wanting. Scape strict, downy, 2–4 in. high, with 1–3 toothed bracts. Flowers few, small, white, racemose or solitary and terminal. Calyx-tube open, silky; segments narrow, ovate, subacute; bractlets short, ovate. Petals slightly exceeding the calyx, retuse. Receptacle glabrous. Achenes stipitate, obliquely ovate, villous, compressed; style much shorter than the achene, hooked at the tip. Heads not spreading.”—*Sieversia albiflora*, *Hook. f. Fl. Antarct.* i. 9, t. 7.

AUCKLAND ISLANDS: *Sir J. D. Hooker, Kirk.*

There are no specimens of this in Mr. Kirk's herbarium, and I have therefore copied the description given in the “*Students' Flora*.” Mr. Kirk remarks that it is separated from *G. parviflorum* by the short ovate bractlets, and compressed oblique achenes with very short styles silky nearly to the apex.

4. *G. uniflorum*, *Buch. in Trans. N.Z. Inst.* ii. (1870) 88.—Rootstock creeping, stout and woody, clothed with the reddish bases of the old leaves and stipules. Leaves all radical, 1–3 in. long; terminal leaflet large, $\frac{3}{4}$ –1 in. diam., oblong- or rounded-reniform, obscurely lobed, deeply crenate-toothed; margins densely ciliated; surfaces with a few sparse long hairs or almost glabrous; lateral leaflets 1–2 pairs, minute, deeply toothed and ciliated. Scapes 3–6 in. high, slender, pubescent or villous; bracts 1–2, small, narrow, entire or toothed. Flower solitary, large, white, $\frac{3}{4}$ –1 $\frac{1}{4}$ in. diam. Calyx-lobes linear-oblong, obtuse, villous with long hairs. Petals large, broadly obovate or almost orbicular. Achenes villous with long hairs, gradually narrowed into a very long style hooked at the tip.—*Kirk, Students' Fl.* 129.

SOUTH ISLAND: Nelson—Mount Cobb, *F. G. Gibbs!* Discovery Peaks, *H. H. Travers!* Mount Buckland, *Townson!* Canterbury and Westland—Mountains above Arthur's Pass, *T. F. C.*; Kelly's Hill, *Petrie* and *Cockayne!* 3000–5000 ft. January–February.

A handsome and distinct species, easily recognised by the large white solitary flowers.

5. *G. leiospermum*, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 2 7.—Small, slender, 3–6 in. high, silky or villous in all its parts. Radical leaves rosulate, spreading, 1–2 in. long, pinnate; terminal leaflet $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., broadly ovate or rounded, sometimes obscurely lobed, closely and unequally sharply toothed; lateral leaflets

6-8 pairs, gradually diminishing towards the base of the petiole, sharply toothed or incised; cauline leaves or bracts few, deeply incised. Flowering-stems few or several, erect or spreading, strict, terete, clothed with a short fine pubescence intermixed with long silky hairs, branched above, forming a few-flowered cymose panicle. Flowers small, white, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam.; pedicels elongating in fruit. Calyx-tube turbinate; lobes ovate-deltoid, acute. Petals small, rounded. Fruiting receptacle silky. Achenes numerous, spreading, $\frac{1}{12}$ in. long, perfectly glabrous, oblong-ovoid, somewhat turgid, narrowed into a short hooked or spirally recurved style.—*Kirk, Students' Fl.* 130.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.*; Mount Murchison, *W. Townson*! Canterbury—Broken River, *Enys*! Otago—Upper Wai-pori, Mount Cardrona, Cambrians, *Petrie*! Ben Lomond, near Queenstown, *B. C. Aston*! STEWART ISLAND: *G. M. Thomson*. 1000-4000 ft.

Readily distinguished from all the preceding species by the smooth and glabrous achenes narrowed into a very short recurved style.

6. **G. pusillum**, *Petrie in Trans. N.Z. Inst.* xxviii. (1896) 538. —Small, depressed, 1-2 in. high. Leaves few, all radical, rosulate, obovate-spathulate in outline, $\frac{3}{4}$ -1 in. long, sparsely covered with rather long strigose hairs, pinnate; terminal leaflet $\frac{1}{4}$ - $\frac{1}{3}$ in. broad, rounded, crenate-toothed; lateral leaflets 5-8 pairs, gradually diminishing in size, bluntly toothed. Scapes 1-2 in. high, 1-flowered, simple, naked or with 1-3 minute bracts, finely and closely pubescent. Flowers minute, white. Calyx-tube broadly turbinate; lobes ovate-deltoid. Petals 5-6, small, elliptic-oblong. Fruiting receptacle elongated, villous. Achenes very small, perfectly glabrous, obliquely oblong or obovoid; style minute, reduced to a recurved point.—*Kirk, Students' Fl.* 130.

SOUTH ISLAND: Otago—Old Man Range, altitude 5000 ft., *Petrie*!

Allied to *G. leiospermum*, but separated by the much reduced size, 1-flowered scapes, smaller flowers, and minute achenes, the style of which is reduced to little more than a hooked point.

3. **POTENTILLA**, Linn.

Perennial herbs, rarely shrubs. Leaves either pinnate or digitately 3-5-foliolate; stipules adnate to the petiole. Flowers solitary or in corymbose cymes. Calyx persistent, lobes 5 or rarely 4, valvate, alternating with as many bracteoles. Petals 5, rarely 4, usually broad. Stamens numerous. Disc annular or coating the calyx-tube. Carpels many, rarely few, seated on a small dry receptacle; style persistent or deciduous, terminal or lateral; ovule solitary, pendulous. Achenes usually numerous, crowded into a head surrounded by the persistent calyx.

A large genus in the arctic and temperate portions of the Northern Hemisphere, extending into the mountains of the tropics, but extremely rare in the Southern Hemisphere. The New Zealand species is almost cosmopolitan.

1. **P. anserina**, Linn. *Sp. Plant.* 495.—Rootstock tufted, giving off long creeping runners rooting at the nodes. Leaves all radical, numerous, 2–6 in. long, unequally pinnate, green and glabrous or slightly silky above, white with appressed silvery tomentum beneath; leaflets numerous, $\frac{1}{3}$ –1 in. long, oblong or obovate or rounded, alternate ones often minute, deeply and sharply toothed or incised. Peduncles from the rootstock or rooting nodes, 2–6 in. long, 1-flowered. Flowers $\frac{1}{2}$ –1 in. diam., yellow. Calyx silky and villous; lobes lanceolate or oblong; bracteoles lobed and cut. Petals obovate. Achenes glabrous or nearly so; receptacle villous.—*Hook. f. Fl. Nov. Zel.* i. 54; *Handb. N.Z. Fl.* 54; *Kirk, Students' Fl.* 131.

Var. **b**, **anserinoides**.—Leaflets smaller, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, sessile or petioled.—*P. anserinoides*, *Raoul, Choix*, 28.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Common in moist places from the Auckland Isthmus southwards, ascending to nearly 3000 ft. *Silver-weed*. December–January.

The typical form of the species is almost cosmopolitan; the var. *anserinoides*, which is often difficult to distinguish from it, is said to be endemic. It is much the most plentiful state in New Zealand.

4. **ACÆNA**, Linn.

Silky or glabrous perennial herbs; stems erect at the tips, decumbent or creeping at the base, or altogether prostrate. Leaves alternate, unequally pinnate; leaflets toothed or incised; stipules sheathing at the base, adnate to the petiole. Flowers hermaphrodite or unisexual, small, crowded in a terminal globose head, or in an interrupted spike. Calyx-tube persistent, obconic or turbinate or campanulate, constricted at the mouth, terete or angled, naked or at length armed with simple or barbed spines; lobes 3–7, valvate, persistent or deciduous. Petals wanting. Stamens 1–10, very rarely more. Carpels 1–2, wholly immersed in the calyx-tube; style subterminal, short, exserted, dilated into a fimbriate or plumose stigma; ovule solitary, pendulous. Achenes solitary or rarely 2, enclosed in the hardened calyx, which is usually armed with subulate spines or bristles. Pericarp bony or membranous.

Species about 35, widely spread in the temperate regions of the Southern Hemisphere, but most plentiful in Chili and Peru. One of the New Zealand species is found in Australia and Tasmania, and another in Fuegia and the Falkland Islands; the remainder are endemic.

A. Calyx-tube not compressed, 4-angled, usually with a stout spine at each angle, rarely spineless.

* Calyx-tube longer than broad.

Usually silky. Heads large, $\frac{3}{4}$ –1 $\frac{1}{2}$ in.; spines long, red-purple. Achene narrowed at both ends	1. <i>A. novæ-zealandiæ</i> .
Usually silky. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. Achenes broadest near the base, narrowed upwards	2. <i>A. sanguisorbæ</i> .
Usually glabrous; leaves often glaucous. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. Achenes narrowed at both ends	3. <i>A. adscendens</i> .

** Fruiting calyx broader than long.

Glabrous or sparingly silky. Heads pedunculate or sessile ;
 spines bright-red, rarely wanting 4. *A. microphylla*.
 Usually densely villous. Leaves pale, often hoary. Heads
 sessile ; spines usually yellow 5. *A. Buchananii*.

B. Calyx-tube much compressed, spineless.

Perfectly glabrous. Heads large, $\frac{1}{2}$ – $\frac{3}{4}$ in. 6. *A. glabra*.

A. Huttoni, R. Br. (*ter*) in Trans. N.Z. Inst. xvi. (1884) 382, is the European *Poterium sanguisorba*, Linn., which is sparingly naturalised in several parts of the colony.

1. *A. novæ-zealandiæ*, T. Kirk in Trans. N.Z. Inst. iii. (1871) 177.—Stems prostrate, much branched, stout and woody at the base ; branches ascending or erect, leafy, silky or nearly glabrous. Leaves $1\frac{1}{2}$ –3 in. long, usually glabrous above, silky beneath ; leaflets 4–7 pairs, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, oblong or elliptical, rounded at both ends, coarsely serrate. Peduncles stout, terminating the branches, 2–6 in. long ; heads globose, large, $\frac{3}{4}$ – $1\frac{1}{4}$ in. diam. in fruit. Calyx-tube narrow, obconic, 4-angled, pilose ; lobes 4, persistent. Stamens 2–3. Fruiting-calyx narrow, 4-angled, slightly winged at the angles ; bristles 4, very long, reddish-purple, barbed at the end. Achene coriaceous, narrow linear-oblong, widest in the middle, tapering to both ends.—*Students' Fl.* 133. *A. macrantha*, Col. in Trans. N.Z. Inst. xxiii. (1891) 383.

NORTH AND SOUTH ISLANDS : Not uncommon from the Auckland Isthmus southwards. November–January.

Very closely allied to *A. sanguisorbæ*, but a larger and coarser plant, with larger heads, longer purplish-red spines, and a longer and narrower achene. Mr. Kirk distinguishes a var. *pallida*, with paler foliage and the spines often greenish.

2. *A. sanguisorbæ*, Vahl. Enum. i. 294.—Stems prostrate, much branched, often woody at the base ; branches leafy, ascending at the tips, more or less silky. Leaves very variable in size, 1–3 in. or more ; leaflets 3–6 pairs, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, oblong or obovate or almost orbicular, membranous, deeply toothed or serrate, glabrous or nearly so above, silky-hairy beneath, the upper pairs usually longer than the lower. Peduncles slender, 2–6 in. long ; heads globose, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. in fruit. Calyx-lobes 4, persistent. Stamens 2. Stigma broad, fimbriate. Fruiting-calyx 4-angled, with a long barbed bristle at each angle. Achene narrow, broadest below the middle, tapering to the apex.—*A. Cunn. Precur.* n. 566 ; *Raoul, Choix*, 49 ; *Hook. f. Fl. Nov. Zel.* i. 54 ; *Handb. N.Z. Fl.* 56 ; *Benth. Fl. Austral.* ii. 434 ; *Kirk, Students' Fl.* 133. *Ancistrum anserinæfolium*, Forst. Char. Gen. 4. *A. diandrum*, Forst. Prodr. n. 52.

Var. *pilosa*, Kirk, l.c.—Leaves white with appressed silky hairs ; teeth coarser.—*Ancistrum decumbens*, Gaertn. Fruct. i. 163, t. 32.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND, CAMPBELL, ANTIPODES, AND MACQUARIE ISLANDS: Abundant throughout, from sea-level to 3500 ft.; the var. *pilosa* usually sub-alpine. *Piripiri*. November–February. Also in Australia, Tasmania, and Tristan d'Acunha.

A well-known plant. The heads or “burrs” are often troublesome to sheep-farmers from the readiness with which they adhere to wool.

3. **A. adscendens**, Vahl. *Enum.* i. 297.—Stems stout, prostrate, much branched; branches leafy, erect or ascending at the tips, glabrous or sparingly hairy. Leaves 2–4 in. long; leaflets 4–6 pairs, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, ovate or obovate or rounded, obtuse, membranous, often glaucous, coarsely and deeply toothed sometimes half-way to the midrib; teeth often tipped with a pencil of silky hairs. Peduncles stout, strict, 4–8 in. long, glabrous or slightly pubescent; heads $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. in fruit. Calyx-tube silky, obconic; lobes 4, persistent. Stamens 2. Stigma fimbriate. Fruiting-calyx narrow-obconic, 4-angled; bristles 4, short and stout, barbed at the tip. Achene tapering to both ends.—*Hook. f. Fl. Antarct.* i. 10; ii. 268, t. 96; *Handb. N.Z. Fl.* 56; *Kirk, Students' Fl.* 133.

SOUTH ISLAND: Not uncommon in mountain districts, altitude 2000–5000 ft. MACQUARIE ISLAND: At sea-level, *Fraser, Prof. Scott*.

This is very closely allied to *A. sanguisorbæ*, but can usually be distinguished by the more glabrous habit, rounder glaucous and more deeply toothed leaflets, long stout peduncles, and short stout bristles. The stems and peduncles are often reddish-purple.

4. **A. microphylla**, Hook. f. *Fl. Nov. Zel.* i. 55.—Stems prostrate, much branched, often forming extensive patches; branches short, slender, glabrous or nearly so. Leaves $\frac{3}{4}$ –2 in. long, glabrous or sparingly silky, often glaucous, membranous; leaflets 3–6 pairs, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, broadly ovate or rounded, deeply inciso-serrate or crenate, cuneate or rounded at the base. Heads globose, variable in size, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam. in fruit, on slender peduncles 1–3 in. long or sessile. Calyx-tube silky or glabrous, broadly turbinate; lobes 4, persistent. Stamens 2. Fruiting-calyx short, broader than long, 4-angled, slightly winged at the angles; bristles 4, stout, spreading, bright-red, often wanting. Achenes usually 2, bony.—*Handb. N.Z. Fl.* 56; *Kirk, Students' Fl.* 134.

Var. **depressa**, Kirk, l.c.—Branches closely appressed to the ground. Leaves smaller. Heads few-flowered, sessile or very shortly peduncled.—*A. depressa*, Kirk in *Trans. N.Z. Inst.* ix. (1877) 548.

Var. **inermis**, Kirk, l.c.—Leaves longer, 1–4 in. long, usually glaucous; leaflets $\frac{1}{2}$ – $\frac{1}{3}$ in. Fruiting-calyx without bristles.—*A. inermis*, Hook. f. *Fl. Nov. Zel.* i. 54; *Handb. N.Z. Fl.* 57.

NORTH AND SOUTH ISLANDS: Not uncommon in mountain districts from the East Cape southwards. Sea-level to 3500 ft. November–January.

A very variable plant. I agree with Mr. Kirk in uniting *A. depressa* and *A. inermis* with it. The length of the peduncle is a very variable character, and heads with or without bristles can easily be found on the same plant. Mr. Kirk states that the achene is solitary, but I find usually two in each fruiting-calyx, as described by Hooker.

5. **A. Buchanani**, *Hook. f. Handb. N.Z. Fl.* 57.—Stems and branches numerous, prostrate, closely appressed to the ground; young ones more or less villous with silky hairs. Leaves $\frac{1}{2}$ –1 in. long, hoary or silky, sometimes densely so; leaflets 3–6 pairs, broadly oblong-ovate or rounded, deeply minutely toothed. Heads small, 3–10-flowered, sessile. Calyx-tube broadly turbinate, 4-angled, densely villous; lobes 4, persistent. Stamens 2. Stigma fimbriate. Fruiting-calyx short and broad, 4-angled and ridged, pilose; bristles 4, stout, spreading, yellow, usually hairy above or barbed. Achenes 1 or 2, bony.—*Kirk, Students' Fl.* 134.

SOUTH ISLAND: Otago—Lake District, *Hector* and *Buchanan*! upper part of the Clutha Valley, *Petrie*!

This can be recognised by the small size, pale-greyish colour, villous leaves and branches, small sessile heads, and yellow bristles.

6. **A. glabra**, *Buch. in Trans. N.Z. Inst.* iv. (1872) 226, t. 14.—Everywhere perfectly glabrous. Stems much branched, prostrate, stout and woody at the base; branches erect or ascending, leafy. Leaves $\frac{3}{4}$ –1 $\frac{1}{4}$ in. long; leaflets 3–4 pairs, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, obovate or oblong-obovate, cuneate at the base, deeply and coarsely toothed. Peduncles 2–5 in. long, stout; heads globose, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., often unisexual. Calyx-tube much compressed, the lateral angles produced into a broad wing-like process on each side; lobes 4, broad, persistent. Male flowers with 20–40 stamens; females with 1 or 2; stigma fimbriate. Fruiting-calyx always unarmed, red. Achene narrow, tapering to both ends.—*Kirk, Students' Fl.* 134.

SOUTH ISLAND: Nelson—Wairau Gorge, *Rough, T. F. C.*; Upper Clarence Valley, *Kirk! T. F. C.*; Lake Guyon, *H. H. Travers!* Marlborough—Mount Mouatt and Awatere Valley, *Kirk!* Canterbury—Mount Torlesse, *Petrie!* Broken River, *T. F. C.* Otago—Mount Ida, *Petrie!* mountains above Lake Harris, *Kirk.* 2500–4500 ft. January–February.

A very distinct species, easily recognised by the perfectly glabrous habit and large unarmed heads. It differs from all the other species of the genus in the numerous stamens of the male flowers.

ORDER XXIV. SAXIFRAGÆÆ.

Trees, shrubs, or herbs. Leaves alternate or opposite, simple or compound, stipulate or exstipulate. Flowers usually regular and hermaphrodite. Calyx free or adnate to the ovary, lobes 4–5, imbricate or valvate. Petals 4–5, rarely wanting, imbricate or valvate. Stamens as many or twice as many as the petals, rarely more, perigynous or epigynous, very rarely hypogynous. Disc usually present between the stamens and the ovary, very various in shape. Ovary free or more or less adnate to the calyx-tube, usually 2–5-celled with 2–5 axile or parietal placentas; styles as many as the cells, free or more or less united; ovules numerous, anatropous, erect or pendulous. Fruit usually capsular, more rarely succulent and indehiscent. Seeds usually small, numerous; albumen generally copious, rarely absent; embryo terete, usually small.

A large and polymorphous order, very difficult to define. The herbaceous genera are mainly found in the temperate regions of the Northern Hemisphere, or on the mountains of the tropics; the arborescent ones have their headquarters in South America or Australia, with a few outlying species in Africa or Asia. Genera about 75; species under 600. The properties of the order are unimportant. Of the 6 genera found in New Zealand, *Carpodetus* and *Ixerba* are monotypic and endemic; *Ackama* and *Quintinia* extend to Australia; *Donatia* has one species in New Zealand and Tasmania, and another in Fuegia; while *Weinmannia* has a wide distribution in warm climates.

* Herbs, forming compact patches. Leaves densely imbricate. Flowers solitary, sessile.

Flowers white, $\frac{1}{3}$ in. diam. Calyx-lobes and petals 5.

Stamens 2. Ovary inferior, 2-3-celled 1. DONATIA.

** Trees. Leaves alternate, simple, exstipulate. Stamens usually as many as the petals.

Flowers racemose, small. Petals imbricate. Ovary inferior

2. QUINTINIA.

Flowers panicled, large. Petals imbricate. Ovary superior

3. IXERBA.

Flowers panicled, small. Petals valvate. Ovary inferior

4. CARPODETUS.

*** Trees. Leaves opposite, stipulate. Stamens usually twice as many as the petals.

Flowers panicled. Calyx valvate

5. ACKAMA.

Flowers racemose. Calyx imbricate

6. WEINMANNIA.

1. DONATIA, Forst.

Small densely tufted herbs, forming hard compact masses. Leaves densely imbricated, linear, coriaceous, quite entire. Flowers terminal, solitary, sessile, white. Calyx-tube adnate to the ovary, obconic; lobes 5-7, equal or unequal. Petals 5-10, linear or ovate. Stamens 2 or 3, inserted on the middle of an epigynous disc, and adnate to the base of the styles; filaments subulate or filiform; anthers didymous, extrorse. Ovary inferior, 2- or 3-celled; styles 2 or 3, short and thick or subulate, recurved; stigmas simple or capitellate; ovules numerous, affixed to placentas which are pendulous from the inner angle of the cells. Capsule turbinate, indehiscent, 2- or 3-celled. Seeds few in each cell, pendulous, obliquely ovoid; testa membranous; albumen fleshy; embryo small, remote from the hilum.

A genus of two species, one found in New Zealand and Tasmania, the other a native of Fuegia. Its exact systematic position is very doubtful; it was referred to *Saxifrageæ* by Hooker, who, however, also pointed out its affinity with the *Stylidiææ*, with which it agrees in the stamens being placed on the centre of an epigynous disc, in the extrorse anthers, and in the placentation. It was removed to that order by the late Baron Mueller ("Nuovo Giornale Botanico Italiano," xi., July, 1879). On the other hand, both Baillon and Engler retain it among the Saxifrages, the latter ("Naturlichen Pflanzenfamilien," Teil iii. Abt. ii. a, p. 67) constituting it a new subsection of the order.

1. *D. novæ-zealandiæ*, Hook. f. *Fl. Nov. Zel.* i. 81, t. 20.—Stems short, 1-3 in. high, densely tufted, forming broad compact masses in mountain-bogs. Leaves very numerous, imbricated in many series and clothing the entire stem and branches, erect,

appressed, $\frac{1}{3}$ in. long, subacute, shining, veinless, very thick and coriaceous, villous at the base. Flowers $\frac{1}{3}$ in. diam., sunk amongst the uppermost leaves. Calyx-lobes 5, ovate, acute. Petals 5, quite free, ovate-oblong, obtuse, thick and fleshy. Stamens 2. Styles 2, short and thick, recurved. Capsule $\frac{1}{5}$ in. long.—*Handb. N.Z. Fl.* 58; *Benth. Fl. Austral.* ii. 450; *F. Muell. Fragm.* viii. 41.

NORTH ISLAND: Mount Holdsworth, Tararua Range, W. Townson! SOUTH ISLAND: Not uncommon in alpine bogs throughout. STEWART ISLAND: *Petrie! Kirk!* Most abundant between 3000 and 5000 ft., but descends almost to sea-level on Stewart Island. December–March.

2. QUINTINIA, A. D. C.

Shrubs or trees. Leaves alternate, coriaceous, exstipulate. Flowers small, in axillary or terminal many-flowered racemes. Calyx-tube obconic, adnate to the ovary; teeth 5, persistent. Petals 5, imbricate, deciduous. Stamens 5, filaments subulate. Ovary inferior, 3–5-celled, the free summit broadly conical, narrowed into a persistent 3–5-grooved style; stigma capitate, 3–5-lobed; ovules numerous. Capsule small, inferior or half-superior, coriaceous, obovoid, 1-celled, 3–5-valved, the valves separating up the furrows of the style. Seeds numerous, ascending; testa loose, winged.

In addition to the two following species, which are endemic in New Zealand, there are three others in Australia.

Leaves 3–6 in., linear-lanceolate to oblong	..	..	1. <i>Q. serrata</i> .
Leaves 3–8 in., obovate or elliptic-oblong	..	..	2. <i>Q. acutifolia</i> .

1. *Q. serrata*, A. Cunn. *Precur.* n. 515.—A small tree 15–30 ft. high; branchlets, leaves, and racemes covered with minute lepidote scales, viscid when young. Leaves coriaceous, yellow-brown or reddish-brown when dry, 2–6 in. long, linear-lanceolate or linear-oblong or oblong, shortly petiolate, remotely and irregularly sinuate-serrate, acute or subacute, margins undulate. Racemes 2–4 in. long, erect, strict, axillary, many-flowered; pedicels short, $\frac{1}{5}$ in. Flowers pale-lilac, $\frac{1}{4}$ in. diam. Capsule woody, $\frac{1}{3}$ in. long.—*Hook. Ic. Plant.* t. 558; *Raoul, Choix*, 47; *Hook. f. Fl. Nov. Zel.* i. 78; *Handb. N.Z. Fl.* 58; *Kirk, Forest Fl.* t. 125; *Students' Fl.* 137. *Q. elliptica*, *Hook. f. Fl. Nov. Zel.* i. 78; *Handb. N.Z. Fl.* 59.

NORTH ISLAND: Common in forests from Mongonui to Taranaki and Hawke's Bay. Sea-level to 3500 ft. *Tawheowheo.* October–November.

Very variable in the size and shape of the leaves. On high mountain-ranges they become shorter, broader, and more obtuse, and the plant is then probably identical with Hooker's *Q. elliptica*. This is said to have elliptic or elliptic-lanceolate entire and obtuse leaves, and was collected in some locality on the East Coast by Colenso.

2. *Q. acutifolia*, T. Kirk, *Students' Fl.* 137.—A small tree 20–40 ft. high, with a trunk 1–2 ft. diam. Branchlets, leaves, and racemes viscid and clothed with lepidote scales. Leaves much broader and thinner than in *Q. serrata*, 3–7 in. long, 1–2 in. broad,

obovate or obovate-oblong or elliptic-oblong, rarely oblong- or elliptic-lanceolate, narrowed into a short stout petiole, acute or subacute, remotely and often obscurely sinuate-serrate. Racemes 2-4 in. long, always much shorter than the leaves. Flowers much as in *Q. serrata*, but filaments usually shorter. Capsule slightly larger.—*Q. serrata* var. b, *Hook. f. Handb. N.Z. Fl.* 59; *Kirk, Forest Fl.* t. 125, f. 6, 7.

NORTH ISLAND: Little Barrier Island, *T. F. C.*; East Cape, *Bishop Williams*! SOUTH ISLAND: West Coast, from Collingwood to Hokitika, *Travers*, *Kirk*! *Helms*! *T. F. C.*

An exceedingly puzzling plant. It is certainly connected by numerous intermediates with the typical state of *Q. serrata*, but its extreme forms appear much too distinct to admit of the two species being united. It is abundant on the Little Barrier Island, where the leaves attain an extreme length of 8 in. by a breadth of $2\frac{1}{2}$ in. Southern specimens have smaller and more elliptic leaves.

3. *IXERBA*, A. Cunn.

A small glabrous tree. Leaves opposite, alternate or whorled, exstipulate. Flowers white, in terminal panicles. Calyx-tube short, adnate to the base of the ovary; lobes 5, imbricate, deciduous. Petals 5, inserted beneath a 5-lobed disc, obovate, clawed, imbricate. Stamens 5, alternating with the lobes of the disc; filaments filiform. Ovary superior, conical, 5-lobed, 5-celled, narrowed into a subulate twisted 5-furrowed style; stigma acute; ovules 2 in each cell, collateral. Capsule coriaceous, broadly ovoid, 5-celled, loculicidally 5-valved; valves extending through the style, ultimately recurved, cohering below, 2-partite above. Seeds large, oblong, compressed, shining; funicle thick; embryo large; albumen very scanty.

A well-marked monotypic genus, confined to New Zealand.

1. *I. brexioides*, A. Cunn. *Precur.* n. 580.—A small branching tree 20-50 ft. high, rarely more, with a trunk 1-2 ft. diam. Leaves 3-6 in. long, $\frac{1}{3}$ -1 in. broad, linear or linear-lanceolate, coriaceous, glabrous, acute or subacute, obtusely serrate; teeth tipped by a gland. Flowers large, 1-1 $\frac{1}{2}$ in. diam.; pedicels jointed, silky. Calyx-lobes broadly ovate, silky. Capsule $\frac{3}{4}$ in. diam.—*Hook. Ic. Plant.* t. 577, 578; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 82; *Handb. N.Z. Fl.* 59; *Kirk, Forest Fl.* t. 48; *Students' Fl.* 138.

NORTH ISLAND: Hilly forests from Ahipara and Maungataniwha to the northern part of Hawke's Bay. Ascends to 3000 ft. *Tawari*. November-December.

A remarkably handsome tree. The wood is hard and dense, and probably durable, but has been little used.

4. *CARPODETUS*, Forst.

A shrub or small tree. Leaves alternate, petiolate, exstipulate. Flowers small, white, in axillary and terminal cymose panicles.

Calyx-tube turbinate, adnate to the ovary; lobes 5-6, small, deciduous. Petals 5-6, inserted under the margin of an epigynous disc, spreading, valvate. Stamens 5-6, inserted with the petals; filaments short, subulate; anthers oblong. Ovary inferior with a free rounded summit, 3-5-celled; style slender; stigma capitate; ovules numerous. Fruit globose, almost fleshy, indehiscent, girt round the middle by the cicatrix of the calyx-limb, 3-5-celled. Seeds numerous, small, pendulous; testa coriaceous, pitted; embryo very small; albumen fleshy.

The genus is limited to a single species, endemic in New Zealand.

1. **C. serratus**, *Forst. Char. Gen.* 34, t. 17A.—A shrub or small tree 15-30 ft. high, with a trunk 6-9 in. diam.; branches often flattened, spreading; young twigs, leaves, petioles, and inflorescence more or less pubescent. Leaves 1-2 in. long, ovate-oblong or elliptical, acute or obtuse, sharply and coarsely serrate, narrowed into a petiole $\frac{1}{4}$ – $\frac{1}{2}$ in. long; in young plants often panduriform or irregularly lobed. Panicles broad, many-flowered, shorter than the leaves. Flowers $\frac{1}{5}$ in. diam., white, very abundantly produced. Capsule about the size of a small pea, black and shining when fully ripe.—*A. Rich. Fl. Nouv. Zel.* 366; *A. Cunn. Precur.* n. 575; *Hook. Ic. Plant.* t. 564; *Raoul, Choix*, 50; *Hook. f. Fl. Nov. Zel.* i. 78; *Handb. N.Z. Fl.* 59; *Kirk, Forest Fl.* t. 47; *Students' Fl.* 138.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the North Cape southwards; most plentiful in alluvial ground, by the banks of rivers, &c. Ascends to 3000 ft. *Piripiriwhata*; *Putaputawheta*. November-January.

Wood strong and tough, but not durable; sometimes used for axe-handles, &c.

5. **ACKAMA**, *A. Cunn.*

Small trees. Leaves opposite, pinnate, stipulate. Flowers small, unisexual, in compound panicles. Calyx-tube short, lobes 5, ovate-triangular, persistent, valvate. Petals 5, inserted under the margin of a perigynous disc, scarcely longer than the calyx. Stamens 10, inserted with the petals; filaments filiform, the alternate ones longer; anthers didymous. Ovary free, 2-celled; styles 2, persistent; ovules numerous in each cell. Capsule small, coriaceous, turgid, 2-celled, septicidally 2-valved. Seeds ovoid, apiculate, hairy; embryo cylindric, in the axis of fleshy albumen.

Besides the New Zealand species, which is endemic, there is another from Australia. The genus only differs from *Weinmannia* in the paniculate inflorescence and valvate calyx.

1. **A. rosæfolia**, *A. Cunn. Precur.* n. 520.—A handsome small tree 20-40 ft. high, with a trunk 1-2 ft. diam.; branchlets, leaves, petioles, and inflorescence more or less covered with short brownish

pubescence. Leaves 3–10 in. long, imparipinnate; leaflets 3–8 pairs, 1–3 in. long, narrow-oblong to elliptical, sessile or very shortly petioled, acute, acutely serrate, membranous, upper larger than the lower; stipules large, leafy, toothed, deciduous. Panicles much branched, many-flowered, longer or shorter than the leaves. Flowers unisexual, minute, $\frac{1}{10}$ in. diam., sessile on the slender branches of the panicle. Ovary densely pilose. Capsule very small, $\frac{1}{8}$ in. long, sparingly silky when mature.—*Raoul, Choix*, 47; *Hook. f. Fl. Nov. Zel.* i. 79; *Handb. N.Z. Fl.* 60; *Kirk, Forest Fl.* t. 63; *Students' Fl.* 139. *Weinmannia rosæfolia*, *A. Gray, Bot. U.S. Expl. Exped.* 671, t. 84.

NORTH ISLAND: From Kaitaia and Mongonui southwards to Whangarei, not common. *Makamaka*. September–October.

6. WEINMANNIA, Linn.

Shrubs or trees. Leaves opposite, petiolate, simple or 3-foliate or imparipinnate, stipulate. Flowers in terminal or axillary racemes. Calyx inferior, divided almost to the base into 4–5 imbricate segments. Petals 4–5, inserted under the margin of a perigynous disc. Stamens 8–10, inserted with the petals. Ovary free, ovoid or conic, 2-celled, 2-beaked; styles 2, subulate; ovules few or many in each cell, pendulous. Capsule small, coriaceous, 2-celled, septicidally 2-valved. Seeds oblong or reniform or subglobose, often hairy; embryo terete; albumen fleshy.

A rather large genus of over 50 species, distributed through the Malay Archipelago, Madagascar and the Mauritius, tropical South America, Polynesia, and Australia. The two New Zealand species are both endemic.

Branchlets usually pubescent. Leaves of mature trees

3-foliate or pinnate 1. *W. sylvicola*.

Branchlets usually glabrous. Leaves of mature trees 1-foliate

liolate 2. *W. racemosa*.

1. *W. sylvicola*, *Sol. ex A. Cunn. Precur.* n. 518.—An erect tree, usually from 25 to 50 ft. high, sometimes taller and reaching 60–70 ft.; trunk 1–3 ft. diam.; branchlets, petioles, and midribs of the leaves and inflorescence more or less pubescent or almost glabrous. Leaves 3-foliate or imparipinnate, rarely 1-foliate; leaflets 1 to 4 or 5 pairs or more, 1–2 in. long, obovate-oblong or ovate-oblong to lanceolate, narrowed below, acute or acuminate, coarsely serrate. Leaves of young trees pinnate, with numerous membranous leaflets; of old ones usually 3-foliate, coriaceous. Stipules leafy, entire or toothed. Racemes 1–4 in. long, often numerous towards the ends of the branches, sometimes branched. Flowers very numerous, small, $\frac{1}{12}$ in. diam., white or pale-rose. Capsule usually glabrous, $\frac{1}{5}$ – $\frac{1}{8}$ in. long. Seeds minute, with a tuft of hairs at each end.—*Raoul, Choix*, 47; *Hook. f. Fl. Nov. Zel.* i. 79; *Handb. N.Z. Fl.* 60; *Kirk, Forest Fl.* t. 72; *Students' Fl.* 140. *W. betulina* and *W. fuchsoides*, *A. Cunn. Precur.* n. 516, 517.

NORTH ISLAND: Abundant in forests as far south as the East Cape and Taupo, ascending to 3000 ft. *Tawhero*. December–April.

An exceedingly variable plant. The bark is largely used for tanning.

2. *W. racemosa*, Linn. f. *Suppl.* 227. — A taller tree than *W. sylvicola*, frequently from 50–80 ft. high or more, with a trunk 1–4 ft. diam.; glabrous when mature, except the raceme, which is pubescent. Leaves of young plants pinnately 3–5-foliolate, thin and membranous, often pubescent; of mature plants 1-foliolate, 1–4 in. long, oblong-lanceolate or oblong-ovate to orbicular-ovate, obtuse or subacute, coarsely and obtusely serrate, very coriaceous, quite glabrous. Racemes 1–4 in. long, axillary and terminal, sometimes branched; rachis pubescent; pedicels stout. Flowers numerous, very similar to those of *W. sylvicola* but rather larger. Ovary pubescent. Capsule $\frac{1}{2}$ in. long, 2–3-valved. Seeds hairy. — *Forst. Prodr.* n. 173; *A. Rich. Fl. Nov. Zel.* 321; *Hook. f. Fl. Nov. Zel.* i. 80; *Handb. N.Z. Fl.* 61; *Kirk, Forest Fl.* t. 73; *Students' Fl.* 140. *Leiospermum racemosum*, Don. in *Edinb. N. Phil. Journ.* 1830, 91; *A. Cunn. Precur.* n. 519.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Plentiful in forests from the Thames Goldfields and middle Waikato southwards. Sea-level to 3000 ft. *Towai*; *Kamahi*. December–January.

Very closely allied to *W. sylvicola*, but can generally be separated by the larger 1-foliolate leaves of the mature stage.

ORDER XXV. CRASSULACEÆ.

Succulent or fleshy herbs or undershrubs. Leaves opposite or alternate, generally simple; stipules wanting. Flowers regular, hermaphrodite or rarely unisexual. Calyx persistent, free, usually 3–5-fid or -partite. Petals as many as the sepals, free or more or less cohering into a lobed corolla, inserted at the base of the calyx. Stamens as many or twice as many as the petals, inserted with the petals and sometimes adnate to them. Ovary superior, of as many carpels as petals; carpels free or connate below, 1-celled, usually with a small gland or scale at the base of each; styles simple; ovules usually numerous, attached to the ventral suture (few in *Tillæa*). Fruit of several 1-celled follicles, dehiscing along the ventral suture. Seeds few or many, minute, albuminous; embryo terete, cotyledons short.

A rather large order, spread over the whole world except Polynesia. Particularly abundant in South Africa, where nearly half the species are found; also plentiful in the rocky districts of Europe and central Asia; rare in Australia and South America. Genera about 15; species estimated at 400. All the species are inert, and are of little importance from an economic point of view. The single New Zealand genus is almost cosmopolitan.

TILLÆA, Linn.

Small and slender somewhat succulent glabrous herbs. Leaves opposite, entire. Flowers minute, axillary, solitary or fascicled,

sometimes cymose. Calyx 3-5-lobed or -partite. Petals 3-5, free or connate at the base. Stamens the same number as the petals. Hypogynous scales 1 to each carpel or wanting. Carpels 3-5, narrowed into short styles; ovules 1 or more to each carpel. Follicles few- or many-seeded.

An almost cosmopolitan genus, comprising about 25 species. Two of those found in New Zealand also occur in Australia, and another in temperate South America, the Falkland Islands, and Kerguelen Island. Several of the New Zealand species are imperfectly known, and require careful study with recent specimens before satisfactory diagnoses can be prepared.

* A small scale at the base of each carpel.

- | | |
|---|----------------------------|
| Stems 2-7 in., red-brown. Leaves $\frac{1}{5}$ - $\frac{1}{3}$ in., oblong-spathulate. Flowers large, $\frac{1}{6}$ - $\frac{1}{5}$ in. diam. | 1. <i>T. moschata</i> . |
| Stems 2-4 in., reddish. Leaves $\frac{1}{4}$ - $\frac{1}{3}$ in., linear, acute. Flowers $\frac{1}{10}$ - $\frac{1}{10}$ in. | 2. <i>T. Helmsii</i> . |
| Stems 1-3 in., reddish, slender, matted. Leaves $\frac{1}{12}$ - $\frac{1}{8}$ in., linear-oblong, obtuse. Flowers $\frac{1}{15}$ in. | 3. <i>T. diffusa</i> . |
| Minute, delicate, matted, often less than 1 in. high. Leaves linear-oblong, fleshy, concave, $\frac{1}{20}$ - $\frac{1}{12}$ in. Flowers white, $\frac{1}{15}$ - $\frac{1}{12}$ in. | 4. <i>T. Sinclairii</i> . |
| Prostrate and rooting, intricately branched, matted. Leaves thin, obtuse or subacute, $\frac{1}{15}$ - $\frac{1}{12}$ in. Petals rather longer than the calyx | 5. <i>T. pusilla</i> . |
| Prostrate and rooting, intricately branched. Leaves thin, acute or apiculate, $\frac{1}{15}$ - $\frac{1}{10}$ in. Petals shorter than the calyx | 6. <i>T. acutifolia</i> . |
| Stems decumbent and ascending, red-purple, $\frac{3}{4}$ -2 in. Leaves ovate-subulate, fleshy, concave. Flowers $\frac{1}{10}$ - $\frac{1}{8}$ in. Seeds 8 | 7. <i>T. multicaulis</i> . |

** No scales.

- | | |
|--|---------------------------|
| Stems erect, simple or branched, red-brown, 1-5 in. Leaves oblong, subacute, fleshy. Flowers minute, in dense leafy clusters | 8. <i>T. Sieberiana</i> . |
| Stems delicate, intricately branched, prostrate, 2-3 in. Leaves linear-oblong, acute, $\frac{1}{18}$ - $\frac{1}{12}$ in. Petals ovate-acuminate | 9. <i>T. debilis</i> . |
| Minute, delicate, tufted, $\frac{1}{2}$ -2 in. high. Peduncles slender, much elongated in fruit. Carpels many-seeded | 10. <i>T. purpurata</i> . |

T. Hamiltonii, T. Kirk ex W. Hamilton in Trans. N.Z. Inst. xvii (1885)
92, is *Tetrachondra Hamiltonii*, Petrie ex Oliv. in Ic. Plant. t. 2250 (order Boraginæ).

1. ***T. moschata***, D.C. *Prodr.* iii. 382.—A small tufted succulent red-brown herb; stems 2-7 in. long, prostrate and rooting below, erect or ascending at the tips. Leaves connate at the base, thick and fleshy, $\frac{1}{5}$ - $\frac{1}{3}$ in. long, oblong-spathulate or linear-obovate or linear-oblong, obtuse. Flowers $\frac{1}{6}$ - $\frac{1}{5}$ in. diam., axillary, solitary; peduncles short. Calyx deeply 4-lobed; lobes obtuse, much shorter than the oblong obtuse petals. Scales 4, linear-cuneate, truncate at the tip. Carpels 4, turgid, obtuse; styles short, recurved. Seeds 6-8, rarely more.—*Hook. Ic. Plant.* t. 535; *Hook. f. Fl. Nov. Zel.* i. 76; *Handb. N.Z. Fl.* 61; *Kirk, Students' Fl.* 142. *Bulliarda moschata*, D'Urv. in *Mem. Soc. Linn. Par.* iv. 618; *Hook. f. Fl. Antarct.* i. 13.

NORTH ISLAND: Shores of Cook Strait, from Cape Palliser to Cape Terawhiti. SOUTH ISLAND: Queen Charlotte Sound, *Banks and Solander*! Coast near Westport, *W. Townson*! Banks Peninsula, *Armstrong*. Otago—Cliffs on the eastern and southern shores, *Petrie*! *Kirk*! CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLANDS, MACQUARIE ISLAND: Not uncommon.

This is purely a coast plant, and is never seen far from the sea. It is also a native of Chili, Fuegia, Falkland Islands, Kerguelen Island, and Marion Island.

2. **T. Helmsii**, *T. Kirk*, *Students' Fl.* 142.—Stems numerous, often forming large intricate patches, slender, 2–6 in. long, prostrate at the base, ascending above, green or reddish-green. Leaves rather distant, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, linear, acute. Flowers $\frac{1}{12}$ – $\frac{1}{10}$ in. diam., axillary, solitary, on peduncles shorter than the leaves. Calyx deeply 4-lobed; lobes ovate, acute. Petals a third longer than the calyx, ovate-oblong, subacute. Scales 1 at the back of each carpel, narrow linear-cuneate. Carpels 4, turgid, about as long as the calyx; styles short, recurved. Seeds 3–5.

SOUTH ISLAND: West Coast—Karamea, *Rev. F. H. Spencer*; Westport, *W. Townson*! Greymouth, *R. Helms*! December–March.

Very near to the Australian *T. recurva*, Hook. f., which, however, is a larger plant, with more pointed leaves, and with the calyx-lobes and petals decidedly acuminate. It is easily distinguished from *T. moschata* by the more slender habit, narrower acute leaves, and smaller flowers.

3. **T. diffusa**, *T. Kirk in Trans. N.Z. Inst.* xxiv. (1892) 424.—A slender much-branched matted plant forming broad reddish patches. Stems filiform, erect or prostrate, 1–3 in. long. Leaves in distant pairs, fleshy, connate at the base, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, linear-oblong, obtuse, concave above, convex beneath. Flowers minute, about $\frac{1}{15}$ in. diam., solitary, on very short axillary peduncles. Calyx-lobes 4, broadly oblong, obtuse. Petals equalling the calyx-lobes or rather longer, broadly oblong, obtuse. Scales 4, cuneate. Carpels ovoid; styles recurved. Seeds 2–4.—*Students' Fl.* 144.

NORTH ISLAND: Miramar, Port Nicholson, *Kirk*! STEWART ISLAND: *Kirk*!

Mr. Kirk states that the scales are absent; but I find them to be constantly present, although difficult to detect except in young flowers.

4. **T. Sinclairii**, *Hook. f. Handb. N.Z. Fl.* 62.—A minute delicate creeping or erect usually matted plant, rarely more than 1 in. high except when growing in water, when the stems are often elongated, and the leaves larger. Leaves minute, closely placed or distant, connate at the base, $\frac{1}{20}$ – $\frac{1}{12}$ in. long, linear or linear-oblong, acute or subacute, concave above, convex or almost keeled beneath. Flowers on short or long axillary peduncles, minute, $\frac{1}{15}$ – $\frac{1}{12}$ in. diam., white. Calyx-lobes ovate-oblong, obtuse. Petals about twice as long as the calyx-lobes, oblong, obtuse. Scales 4, linear-

cuneate. Carpels 4, turgid; styles oblique, slightly recurved. Seeds 3-4, rarely more.—*Kirk, Students' Fl.* 142. *T. novæ-zealandiæ*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 270; *Kirk, l.c.* 142.

Var. *obtusa*.—Stems stouter, creeping, 1-2 in. long or more. Leaves longer, more acute. Flowers rather larger; petals rounded.—*T. novæ-zealandiæ* var. *obtusa*, *Kirk, l.c.*

NORTH ISLAND: Matata, Bay of Plenty, *Petrie!* SOUTH ISLAND: Nelson to Southland, not uncommon in watery places. Sea-level to 3000 ft. Var. *obtusa*: Lake Waihola, Otago, *Petrie!*

I have felt compelled to reduce Mr. Petrie's *T. novæ-zealandiæ* to this species. The type specimens in his herbarium only differ from the ordinary state of *T. Sinclairii* in being stouter, with thicker and more acute leaves; but these are not characters on which a specific distinction can be based. The flowers and fruit appear identical in both.

5. *T. pusilla*, *T. Kirk, Students' Fl.* 143.—Stems numerous, very slender and delicate, prostrate and rooting, 1-3 in. long, forming broad pale-green matted patches. Leaves minute, in distant pairs, connate at the base, $\frac{1}{15}$ — $\frac{1}{10}$ in. long, linear or linear-lanceolate, obtuse or acute, spreading or reflexed, thin. Flowers minute, $\frac{1}{15}$ in. diam.; peduncles longer or shorter than the leaves. Calyx-lobes ovate-oblong, acute. Petals rather longer, acute or subacute. Stamens equalling the petals. Scales 4, linear-cuneate. Carpels 4, turgid; styles recurved. Seeds 2-4.

NORTH ISLAND: Muddy banks of the Northern Wairoa, *T. F. C.*; Kawakawa, Bay of Islands, *Kirk*; Wairoa Falls, Hunua, *Kirk!* *T. F. C.!* *Petrie!*

Distinguished from *T. Sinclairii* by the different habit, longer much-branched stems, more distant thin and pointed leaves, and shorter narrower petals.

6. *T. acutifolia*, *T. Kirk, Students' Fl.* 143.—Stems very slender, almost capillary, prostrate and rooting, much and intricately branched, forming pale-green matted patches. Leaves minute, in distant pairs, connate at the base, $\frac{1}{15}$ — $\frac{1}{12}$ in. long, narrow-linear or linear-lanceolate, acute or apiculate, thin. Flowers minute, $\frac{1}{20}$ — $\frac{1}{15}$ in. diam., on peduncles shorter than the leaves. Calyx deeply divided; segments linear-lanceolate, acuminate. Petals narrow-ovate, shorter than the calyx. Scales 4, minute. Carpels 4, ovoid, turgid; styles recurved. Mature seeds not seen.

NORTH ISLAND: Hurunuiorangi, *Kirk!* SOUTH ISLAND: Winton Forest, Southland, *Kirk!*

This has precisely the habit of *T. pusilla*, but appears to differ in the narrower and more acute leaves, and in the calyx-lobes exceeding the petals. I have seen no specimens except those in Mr. Kirk's herbarium, which are few and incomplete.

7. *T. multicaulis*, *Petrie in Trans. N.Z. Inst.* xix. (1887) 324.—A minute slender much-branched reddish-purple plant; stems prostrate or decumbent below, ascending at the tips. Leaves opposite or in opposite fascicles, remote below, close-set and often imbricating above, connate at the base, $\frac{1}{15}$ — $\frac{1}{12}$ in. long, ovate-subulate,

acute or mucronate, fleshy, concave above, convex or keeled beneath. Flowers solitary, axillary, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam., white or rosy. Calyx-lobes ovate-subulate, acute. Petals 4, exceeding the calyx-lobes, broadly oblong, obtuse. Scales 4. Carpels 4, ovoid; style recurved. Seeds 8.—*Kirk, Students' Fl.* 143.

SOUTH ISLAND: Canterbury—Mount Torlesse and Broken River basin, *Enys! Kirk! T. F. C.*; Lake Tekapo, *T. F. C.* Otago—Maniototo and Manuhirikia Plains, *Petrie!* 1000–3000 ft. December–January. A well-marked plant.

8. **T. Sieberiana**, *Schultz, Mant.* iii. 345.—A small pale reddish-brown succulent annual; stems 1–5 in. high, erect, simple or branched from the base. Leaves minute, $\frac{1}{10}$ in. long, connate at the base, ovate-oblong or linear-oblong, subacute, thick and fleshy, concave above, convex beneath. Flowers very minute, in dense axillary clusters mixed with small leaves, at first sessile, but the peduncles usually lengthen as the fruit ripens. Sepals 4, ovate-lanceolate, acuminate. Petals shorter and narrower, acute. Scales wanting. Carpels 4, linear-oblong, nearly equalling the sepals when ripe. Seeds usually 2.—*Kirk, Students' Fl.* 143. *T. verticillaris*, *D.C. Prodr.* iii. 382; *A. Cunn. Precur.* n. 521; *Raoul, Choix*, 48; *Hook. f. Fl. Nov. Zel.* i. 75; *Handb. N.Z. Fl.* 62; *Benth. Fl. Austral.* ii. 451. *T. muscosa*, *Forst. Prodr.* n. 61 (*non Linn.*); *A. Rich. Fl. Nouv. Zel.* 322.

NORTH AND SOUTH ISLANDS: Abundant throughout, in dry rocky or gravelly places. September–January. Also common in Australia and Tasmania.

9. **T. debilis**, *Col. ex Hook. f. Fl. Nov. Zel.* i. 75.—A very small delicate species; stems intricate, filiform or capillary, prostrate, 2–3 in. long. Leaves in scattered pairs, minute, $\frac{1}{16}$ – $\frac{1}{12}$ in. long, ovate-oblong or linear-oblong. Flowers minute, 1 or 2 in the axils of the leaves, sessile or on slender peduncles. Sepals 4, oblong, subacute. Petals ovate-acuminate, shorter than the sepals. Scales wanting. Carpel ovate-lanceolate, 1- or 2-seeded.—*Kirk, Students' Fl.* 143.

NORTH ISLAND: East Coast, *Colenso!*

The only specimen I have seen of this species is a mere scrap in Mr. Colenso's herbarium, and in the absence of additional information I have reproduced the description given in the Handbook.

10. **T. purpurata**, *Hook. f. in Lond. Journ. Bot.* vi. (1847) 472.—A very slender delicate and fugacious annual; stems 1–2 in. high, erect or suberect, sparingly branched. Leaves remote, connate at the base, $\frac{1}{10}$ – $\frac{1}{6}$ in. long, linear, acuminate, concave above. Flowers minute, $\frac{1}{12}$ in. diam., on slender pedicels that elongate much in fruit. Calyx-lobes 4, ovate, obtuse or subacute. Petals 4, equalling the calyx, acuminate. Scales wanting. Carpels broadly oblong, obtuse. Seeds numerous, usually 10–15.—*Hook. f.*

Fl. Nov. Zel. i. 75; *Handb. N.Z. Fl.* 62; *Benth. Fl. Austral.* ii. 451; *Kirk, Students' Fl.* 144.

NORTH ISLAND: Cape Palliser, *Colenso*. SOUTH ISLAND: Lake Wanaka, *Petrie*!

Also common in south-eastern Australia and Tasmania. The linear acuminate leaves, long pedicels, and many-seeded carpels at once separate it from all the other species found in New Zealand.

ORDER XXVI. DROSERACEÆ.

Herbs, rarely undershrubs. Leaves alternate, often rosulate, stipulate, usually furnished with glandular irritable hairs; vernation circinate. Flowers regular, hermaphrodite. Calyx 4-5-partite or divided into 4-5 free sepals, imbricate, persistent. Petals the same number, hypogynous, rarely perigynous, free or sometimes connate at the base. Stamens 4-5, rarely more, hypogynous or perigynous, rarely epipetalous. Ovary free or nearly so, 1-3-celled; styles 1-5, simple or bifid or multifid; ovules numerous, attached to parietal placentas equalling the styles in number. Capsule membranous, loculicidally 3-5-valved; seeds numerous, albuminous; embryo straight, axile.

A small order, comprising 6 genera and about 120 species, distributed over the whole world with the exception of Polynesia, but most abundant is Australia. The whole of the species capture insects, usually by means of glandular viscid and irritable hairs; but in some cases, as the well-known Venus's fly-trap (*Dionæa muscipula*) by rapidly closing laminæ, which shut the insects as it were in a box. For a full account reference should be made to Mr. Darwin's well-known book on "Insectivorous Plants." The single New Zealand genus is the largest in the order, and has an almost world-wide distribution.

1. DROSERA, Linn.

Herbs, either scapigerous or with a leafy stem. Leaves rosulate or alternate, covered with numerous hair-stalked glands which secrete a drop of transparent viscid fluid. Stipules wanting or adnate to the base of the petiole. Flowers solitary or in terminal often one-sided racemes or cymes. Calyx 4-5-partite. Petals 4-5, hypogynous or rarely perigynous, marcescent. Stamens the same number. Ovary ovoid or globose, 1-celled; styles 2-5, free or connate below; ovules numerous, on 2-5 parietal placentas. Capsule oblong, 2-5-valved. Seeds minute; testa lax.

Species about 100, scattered over the whole world, but most abundant in Australia. Of the 6 found in New Zealand, 1 is endemic, the remaining 5 extend to Australia.

* Scape 1-flowered.

- | | |
|--|----------------------------|
| Leaves spatulate. Calyx-lobes short, rounded. Styles 3, | |
| multifid | 1. <i>D. stenopetala</i> . |
| Leaves linear-ligulate. Calyx-lobes long, linear-oblong. | |
| Styles 3; stigmas capitate | 2. <i>D. Arcturi</i> . |
| Minute. Leaves rosulate, orbicular. Styles 4; stigmas | |
| clavate | 3. <i>D. pygmæa</i> . |

** Scape several- or many-flowered.

Leaves rosulate, spatulate. Styles 3, 2-partite ..	4. <i>D. spathulata</i> .
Leaves long, very narrow-linear, forked or dichotomous ..	5. <i>D. binata</i> .
Stem leafy. Leaves lunate, peltate. Flowers pink. Styles	
3, penicillate	6. <i>D. auriculata</i> .

1. *D. stenopetala*, Hook. f. *Fl. Nov. Zel.* i. 19, t. 9.—Stemless; rootstock short, stout. Leaves 1–4 in. long or more; petioles slender, flat, perfectly glabrous; blade $\frac{1}{4}$ – $\frac{3}{4}$ in., spatulate, the margins and upper surface densely covered with long glandular hairs. Scape 1–6 in. long, exceeding the leaves, slender, glabrous, 1-flowered. Flowers $\frac{1}{3}$ in. diam., white. Calyx broadly campanulate, 5-lobed, glabrous; lobes short, rounded. Petals linear-spathulate; claw very long and narrow. Styles 3, multifid almost to the base.—*Handb. N.Z. Fl.* 63; *Kirk, Students' Fl.* 145.

NORTH ISLAND: Ruahine Range, *Herb. Colenso*! *W. F. Howlett*. SOUTH ISLAND: Not uncommon on the higher central and western mountains, from Mount Arthur southwards. STEWART ISLAND: *Petrie, Kirk*! AUCKLAND ISLANDS: *Hooker, Le Guillon, Kirk*. Altitudinal range 2500–5000 ft. in the South Island, but descending almost to sea-level in the Auckland Islands. December–February.

2. *D. Arcturi*, Hook. in *Journ. Bot.* i. (1834) 247.—Stemless. Rootstock short or 1–2 in. long, clothed with the ragged bases of the old leaves. Leaves 1–4 in. long, erect, linear-ligulate, obtuse, upper portion covered with glandular hairs, lower half glabrous; petiole almost as broad as the blade; early leaves shorter and broader, sometimes quite glabrous. Scape 2–6 in. high, slender, 1-flowered or very rarely 2-flowered. Flowers $\frac{1}{3}$ in. diam., white. Calyx divided almost to the base; lobes 4, linear-oblong. Petals oblong or obovate, slightly exceeding the calyx. Styles 3–4, short; stigmas broad.— *Ic. Plant.* t. 56; *Hook. f. Fl. Nov. Zel.* i. 20; *Handb. N.Z. Fl.* 63; *Benth. Fl. Austral.* ii. 456; *Kirk, Students' Fl.* 145. *D. polyneura*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 460. *D. Ruahinensis*, *Col. l.c.* xxviii. (1896) 593. *D. ligulata* and *D. atra*, *Col. l.c.* xxxi. (1899) 269.

NORTH ISLAND: Ruahine Range, *Colenso, Olsen*! Rangipo Plain, *Petrie*! SOUTH ISLAND, STEWART ISLAND: Abundant in mountain districts throughout. Altitudinal range usually from 2000–5000 ft., but descends almost to sea-level on Stewart Island. Also found in Australia and Tasmania.

3. *D. pygmæa*, *D.C. Prodr.* i. 317.—A very minute stemless species forming flat rosettes $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. Leaves numerous, densely crowded; petioles short, slender; limb $\frac{1}{20}$ – $\frac{1}{15}$ in. diam., upper surface covered with glandular hairs; stipules large, scarious, deeply lobed, forming a beautiful silvery cone in the centre of the rosette. Scapes 1–4, glabrous, filiform, $\frac{1}{2}$ – $\frac{3}{4}$ in. high, 1-flowered. Flowers minute, white. Calyx 4-lobed. Petals slightly longer than the calyx. Styles 4, short, clavate. Capsule oblong, 4-valved.—*Hook. f. Fl. Nov. Zel.* i. 20; *Handb. N.Z. Fl.* 63; *Benth. Fl. Austral.* ii. 457; *Kirk, Students' Fl.* 146.

NORTH ISLAND: Cape Maria van Diemen, *Colenso*! Te Paua, Parengarenga, *T. F. C.*; near Ahipara, *H. Carse*! *R. H. Matthews*! SOUTH ISLAND: Bluff Hill, *Kirk*. December-January. Also in Australia and Tasmania.

A beautiful little plant, probably not uncommon in moist peaty situations, but very easily overlooked.

4. **D. spathulata**, *Labill. Nov. Holl. Pl. i. 79, t. 106, f. 1.*—Stemless. Leaves numerous, crowded, rosulate, $\frac{1}{3}$ – $\frac{3}{4}$ in. long; blade $\frac{1}{8}$ – $\frac{1}{3}$ in., spathulate or obovate or orbicular-obovate, narrowed into a broad and flat petiole of varying length, upper surface and margins covered with glandular hairs; stipules scarious, narrow, laciniate. Scapes 1 or several, 1–6 in. high, usually bearing a secund raceme of 3–7 flowers, but often 2–3-flowered or even 1-flowered. Flowers small, $\frac{1}{5}$ in. diam., white or rose. Calyx deeply divided; lobes 5, linear-oblong. Petals 5, rather longer than the calyx. Styles 3, 2-partite almost to the base, branches entire or again forked.—*Hook. f. Fl. Nov. Zel. i. 20*; *Handb. N.Z. Fl. 63*; *Benth. Fl. Austral. ii. 459*; *Kirk, Students' Fl. 146*. *D. propinqua*, *R. Cunn. Precur. n. 620*. *D. minutula*, *Col. in Trans. N.Z. Inst. xxi. (1889) 81*. *D. triflora*, *Col. l.c. xxii. (1890) 461*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Mongonui southwards, but often local. Sea-level to 4500 ft. November-January. Also in Australia and Tasmania.

Mountain specimens are often much reduced in size, with shorter and broader leaves, 1–2-flowered scapes, and broader calyx-lobes; but they pass by insensible gradations into the ordinary form.

5. **D. binata**, *Labill. Nov. Holl. Pl. i. 78, t. 105, f. 1.*—Stemless. Rootstock short, emitting numerous fleshy roots. Leaves all radical, erect; petioles 2–5 in. long, slender, glabrous; blade 2–4 in., divided to the base into 2 narrow-linear segments $\frac{1}{15}$ – $\frac{1}{10}$ in. broad, which are simple or again forked, upper surface and margins clothed with long glandular hairs. Scapes exceeding the leaves, 6–18 in. high, slender, glabrous, bearing a loose cyme of few or many rather large white flowers $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. Calyx deeply 4–5-lobed; lobes oblong, entire or lacerate at the tips. Petals 4–5, obovate, twice as long as the calyx. Styles usually 3, penicillate.—*Bot. Mag. t. 3082*; *Hook. f. Fl. Nov. Zel. i. 20*; *Handb. N.Z. Fl. 64*; *Benth. Fl. Austral. ii. 461*; *Kirk, Students' Fl. 146*. *D. intermedia*, *R. Cunn. Precur. n. 621*. *D. flagellifera*, *Col. in Trans. N.Z. Inst. xxiii. (1891) 384*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards. Sea-level to 2500 ft. November-February. A common Australian and Tasmanian plant.

A very handsome and conspicuous species. Mr. Colenso's *D. flagellifera*, as shown by the specimens in his herbarium, is merely a small state with narrower and often simple leaf-segments, and can be matched in any locality where the plant is plentiful.

6. **D. auriculata**, *Backh. ex Planch. in Ann. Sci. Nat. Ser. 3, ix. (1848) 295.*—Rootstock slender, terminating in a globose tuber deep

in the ground. Stems leafy, erect, flexuose and wiry, simple or sparingly branched, perfectly glabrous, usually 6–18 in. high but sometimes much longer and almost climbing. Radical leaves rosulate, sometimes reduced to linear scales; blade orbicular or reniform, glandular; petiole short, broad, flat. Cauline leaves alternate, on longer filiform petioles, peltate; blade $\frac{1}{4}$ in. diam., broadly lunate, the two angles with glandular-ciliate appendages, margins fringed with long glandular hairs. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., pink, in terminal 3–8-flowered racemes. Sepals 5, oblong, entire or minutely toothed. Petals twice as long as the sepals, obovate or obcordate. Styles 3, divided to below the middle into numerous dichotomous lobes.—*Hook. f. Fl. Nov. Zel.* i. 21; *Handb. N.Z. Fl.* 64; *Benth. Fl. Austral.* ii. 465; *Kirk, Students' Fl.* 146. *D. circinervia*, *Col. in Trans. N.Z. Inst.* xxvi. (1894) 314. *D. stylosa*, *Col. l.c.* xxviii. (1896) 593.

NORTH AND SOUTH ISLANDS: Abundant as far south as Banks Peninsula. Sea-level to 1500 ft. November–January. Also plentiful in Australia and Tasmania.

ORDER XXVII. HALORAGÆÆ.

Herbs, often aquatic, rarely undershrubs. Leaves opposite, alternate, or whorled, when submerged often pectinately pinnatifid; stipules wanting. Flowers hermaphrodite or unisexual, always small and often incomplete. Calyx-tube adnate to the ovary; lobes 2, 4, or wanting. Petals 2, 4, or wanting, valvate or slightly imbricate. Stamens 2 or 4–8, rarely 1 or 3, large, epigynous; filaments short, filiform; anthers 2-celled. Ovary inferior, compressed, angled or ribbed, rarely 2–4-winged, 2- or 4-celled, rarely 3-celled; styles 1–4, distinct; stigmas papillose or plumose; ovules as many as the styles, pendulous, anatropous. Fruit small, dry or succulent, 1–4-celled, indehiscent or separating into 1–4 indehiscent carpels. Seeds solitary in the cells, pendulous; albumen fleshy, usually copious; embryo cylindrical, axile.

A small order of mostly inconspicuous plants, many of them water-weeds. Genera 8 or 9; species from 80 to 90. I have followed Hooker and Bentham in keeping *Callitriche* in this order, but it must be admitted that it has equal claims to be placed among the *Monochlamydeæ*. Of the 4 New Zealand genera, *Haloragis* is mainly Australian, but extends northwards as far as Japan; *Myriophyllum* and *Callitriche* are almost of world-wide occurrence; while *Gunnera* belongs to the south temperate zone.

Terrestrial. Calyx 4-lobed. Stamens 4–8. Petals valvate. Fruit nut-like, undivided	1. HALORAGIS.
Aquatic. Calyx-lobes obscure. Stamens 4–8. Petals imbricate. Fruit separating into 2–4 nut-like carpels ..	2. MYRIOPHYLLUM.
Subaquatic or terrestrial. Stamens usually 2. Fruit 1-seeded drupe	3. GUNNERA.
Aquatic or subaquatic. Stamen 1. Styles 2. Seeds 4 ..	4. CALLITRICHE.

1. **HALORAGIS**, Forst.

Erect or procumbent branching wiry herbs, sometimes almost woody at the base. Leaves opposite or alternate, entire or toothed or lobed. Flowers unisexual or hermaphrodite, minute, axillary, solitary or clustered, often spicate or racemose. Calyx-tube 4-8-angled or winged; lobes 4, erect, persistent. Petals 4, cucullate, acute, coriaceous, often wanting in the female flowers. Stamens 4-8, filaments usually short. Ovary 2-4-celled; ovules solitary in each cell, pendulous; styles short, stigmas usually plumose in the female flowers. Fruit a small dry 2-4-celled 2-4-seeded nut, sometimes 1-celled and 1-seeded by abortion; the adnate calyx-tube either smooth, ribbed, or muricate.

About 50 species are known, mostly from Australia, but a few are also found in New Caledonia, eastern Asia, and temperate South America (Juan Fernandez). Four of the New Zealand species occur in Australia, and one in the island of Juan Fernandez as well.

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|---|--------------------------|
| Leaves large, lanceolate or oblong, 1-3 in. Flowers crowded, drooping | 1. <i>H. alata</i> . |
| Leaves small, $\frac{1}{4}$ - $\frac{3}{4}$ in., floral ones alternate. Flowers erect, spicate. Fruit 4-8-costate, rugose or tuberculate between the ribs | 2. <i>H. tetragyna</i> . |
| Leaves small, $\frac{1}{10}$ - $\frac{1}{2}$ in., floral ones opposite. Flowers erect, spicate or solitary. Fruit 4-8-costate, smooth between the ribs | 3. <i>H. depressa</i> . |
| Leaves small, $\frac{1}{2}$ - $\frac{3}{4}$ in. Flowers in terminal panicles. Fruit 4-8-costate, smooth between the ribs | 4. <i>H. spicata</i> . |
| Leaves small, $\frac{1}{2}$ - $\frac{3}{4}$ in. Flowers drooping, in naked spikes. Fruit 8-costate, smooth between the ribs | 5. <i>H. micrantha</i> . |

1. ***H. alata***, Jacq. *Misc.* ii. 332.—A coarse erect or suberect branching herb 1-3 ft. high; stems sharply 4-angled, minutely scabrid. Leaves opposite, petiolate, very variable in size, $\frac{1}{2}$ -3 in. long, ovate-lanceolate to oblong, coarsely and sharply serrate, acute or acuminate. Flowers minute, solitary or clustered, in leafy racemes terminating the branches; pedicels short, curved, drooping. Calyx-tube 4-angled; lobes small, broad. Petals twice as long as the calyx-lobes. Stamens 8. Fruit rather small, $\frac{1}{10}$ in. long, ovoid, with 4 ribs more or less dilated into wings; interspaces smooth or rugose.—*Forst. Prodr.* n. 180; *Hook. f. Fl. Nov. Zel.* i. 62; *Handb. N.Z. Fl.* 65; *Benth. Fl. Austral.* ii. 479; *Kirk, Students' Fl.* 148. *Cercodia erecta*, Murr. in *Comm. Gotting.* iii. (1780) 3, t. 1. *C. alternifolia*, A. Cunn. *Precur.* n. 527.

Var. **cartilaginea**.—Shorter and stouter. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., broadly ovate, obtuse or subacute, coarsely serrate, very coriaceous, margins cartilaginous. Fruit conspicuously rugose.—*H. cartilaginea*, Cheesem. in *Trans. N.Z. Inst.* xxix. (1897) 390.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant, especially in lowland districts. Sea-level to 2000 ft. *Toatoa*. November-January. Also in south-eastern Australia and the island of Juan Fernandez. Var. *cartilaginea*: Cliffs at the North Cape, T. F. U.

2. **H. tetragyna**, *Hook. f. Fl. Nov. Zel.* i. 62. — A rigid and wiry much-branched herb 6–15 in. high, usually scabrid with white appressed hairs; stems prostrate or decumbent at the base, erect or ascending above, tetragonous. Leaves opposite, shortly petioled, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, elliptical-ovate or oblong to lanceolate, acute, sharply serrate, coriaceous; floral leaves or bracts usually alternate. Flowers minute, sessile or nearly so, solitary in the axils of the floral leaves, forming slender leafy terminal spikes, which are sometimes branched and paniculate. Stamens 8. Styles 4; stigmas plumose. Fruit $\frac{1}{10}$ in., broadly ovoid, 4–8-costate, transversely rugose or muricate.—*Handb. N.Z. Fl.* 65; *Benth. Fl. Austral.* ii. 484; *Kirk, Students' Fl.* 148. *Goniocarpus tetragynus*, *Labill. Pl. Nov. Holl.* 39, t. 53. *A. Cunn. Precur.* n. 529. *Cercodia incana*, *A. Cunn. l.c.* n. 528.

Var. **diffusa**, *Hook. f. Handb. N.Z. Fl.* 65. — Stems slender, spreading, prostrate. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., broader and more obtuse, with fewer teeth.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: The typical form confined to the district between the North Cape and the Bay of Islands. Var. *diffusa* abundant throughout the Islands. The species is widely distributed in Australia, and is also found in China and Malaya, and in the Khasia Mountains of India.

3. **H. depressa**, *Walp. Rep.* ii. 99. — A small slender wiry much-branched herb 1–5 in. high, usually scabrid with short white hairs; rhizomes slender, creeping, often much branched; stems prostrate or suberect, tetragonous. Leaves opposite, sessile or nearly so, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, ovate or ovate-oblong, sometimes almost cordate, subacute, with 1–4 deep and narrow serratures on each side, coriaceous, margins strongly cartilaginous; floral leaves similar but smaller, usually all opposite. Flowers minute, sessile, axillary and solitary, forming short terminal spikes. Fruit $\frac{1}{10}$ in. long, 4-angled, 4–8-costate; interspaces smooth and shining, not tuberculate.—*Hook. f. Fl. Nov. Zel.* i. 63; *Handb. N.Z. Fl.* 65; *Benth. Fl. Austral.* ii. 485; *Kirk, Students' Fl.* 148. *H. bibracteolata*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 462. *Gonicarpus depressus*, *A. Cunn. Precur.* n. 531.

Var. **aggregata**, *Kirk, l.c.* 149. — Flowers clustered at the tips of the branches, forming small heads.—*H. aggregata*, *Buch. in Trans. N.Z. Inst.* iv. (1872) 224, t. 13.

Var. **serpyllifolia**, *Benth. Fl. Austral.* ii. 485. — Stems 1–4 in., usually creeping and matted, often forming a dense sward. Leaves $\frac{1}{10}$ – $\frac{1}{4}$ in., narrow-ovate to lanceolate, acute at both ends. Flowers fewer, often solitary on the branches. Fruit smaller.—*H. uniflora*, *Kirk in Trans. N.Z. Inst.* ix. (1877) 548. *Gonicarpus serpyllifolius* and *G. vernicosus*, *Hook. Ic. Plant.* t. 290, 311.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, ascending to nearly 4000 ft. Also in Victoria and Tasmania.

A very variable plant. Some forms approach very close to *H. tetragyna*, but usually it can be easily separated from that species by the opposite flowers and the smooth interspaces of the fruit.

4. **H. spicata**, *Petrie in Trans. N.Z. Inst.* xix. (1887) 325.—A slender erect or ascending sparingly branched herb 4–10 in. high, glabrous or pubescent. Leaves few, opposite, shortly petioled, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, ovate or elliptic-ovate, acute or subacute, coriaceous, serrate, pubescent. Flowers in slender terminal branched panicles, sessile in the axils of minute opposite or alternate bracts; terminal 1–3 flowers female; lower flowers apparently all male, but many of the bracts empty in my specimens. Calyx-lobes 4, triangular. Anthers 4; filaments short. Stigmas plumose. Fruit $\frac{1}{10}$ in. long, 4-angled; interspaces smooth or slightly wrinkled.—*Kirk, Students' Fl.* 149.

SOUTH ISLAND: Otago—North end of Lake Hawea, altitude 1100 ft., *Petrie*!

A very curious plant, agreeing with *H. depressa* in the leaves and fruit, but differing widely in the paniculate inflorescence. I suspect that it will prove to be an abnormal state of *H. depressa*.

5. **H. micrantha**, *R. Br. ex Sieb. and Zucc. Fl. Jap.* i. 25.—A tufted much-branched procumbent or ascending herb 2–6 in. high; stems and branches slender, wiry, glabrous or slightly scaberulous. Leaves opposite, very shortly petioled, $\frac{1}{5}$ – $\frac{1}{3}$ in. diam., broadly ovate or almost orbicular, obtuse or subacute, coriaceous, crenate-serrate, the crenatures broad and rounded. Flowers minute, drooping, in slender almost filiform racemes terminating the branchlets; pedicels very short. Petals 4, more than twice as long as the triangular calyx-lobes. Fruit $\frac{1}{20}$ in. long, broadly oblong, 8-costate, interspaces smooth and shining.—*Hook. f. Handb. N.Z. Fl.* 66; *Benth. Fl. Austral.* ii. 482; *Kirk, Students' Fl.* 149. *H. tenella*, *Brong. in Duper. Voy. Cog. Bot.* t. 68, f. 6; *Hook. f. Fl. Nov. Zel.* i. 63. *H. minima*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 259. *Gonicarpus citriodorus*, *A. Cunn. Precur.* n. 530.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from the North Cape southwards. Sea-level to 3500 ft. November–January.

Extends through Australia and Malaya to the Himalayas, China, and Japan. All the fruits that I have examined are 1-seeded by abortion.

2. MYRIOPHYLLUM, Linn.

Glabrous marsh or aquatic herbs, branches often floating. Leaves opposite, alternate, or whorled, the lower leaves when submerged often pinnately divided with capillary segments. Flowers usually monœcious, axillary, solitary or spiked. Males: Calyx-tube very short; limb 4- or rarely 2-lobed or wanting. Petals 2–4, concave. Stamens 2, 4, or 8. Females: Calyx-tube deeply 4-grooved; limb wanting, or of 4 minute subulate lobes. Petals minute or wanting. Ovary inferior, 4- or rarely 2-celled; styles 4 or 2, usually recurved or plumose; ovules solitary in each cell. Fruit deeply 4-furrowed, usually separating into 4 dry indehiscent 1-seeded nuts.

A widely distributed genus of from 15 to 20 species, found in fresh waters in nearly all parts of the world. One of the New Zealand species is endemic, the rest extend to Australia, and one to South America as well.

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| Leaves whorled; lower pectinately pinnatifid, with capillary segments; upper oblong, entire | 1. <i>M. elatinoides</i> . |
| Leaves whorled; lower pectinately pinnatifid, with capillary segments; upper linear, entire or serrate | 2. <i>M. intermedium</i> . |
| Leaves whorled, all pectinately pinnatifid. Nuts large, tubercled | 3. <i>M. robustum</i> . |
| Minute, 1-3 in. All the leaves opposite, minute, linear-spathulate, entire | 4. <i>M. pedunculatum</i> . |

1. *M. elatinoides*, *Gaud. in Ann. Sci. Nat. Ser. i. 5 (1825) 105*.—Forming dense masses in still waters. Stems slender. 6 in. to 3 ft. long according to the depth of the water. Submerged leaves in whorls of 4, rarely more, deeply pectinately pinnatifid, the segments capillary; the upper emerged or floral leaves in whorls of 4 or 3, sometimes opposite, much smaller, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, ovate or oblong to broadly lanceolate, sessile, obtuse, entire or the lower slightly toothed. Male flowers: Calyx-lobes very minute. Petals 4, oblong. Stamens 8. Females: Calyx-lobes and petals apparently wanting. Nuts 4, small, oblong, smooth.—*Hook. f. Fl. Nov. Zel. i. 63*; *Handb. N.Z. Fl. 66*; *Benth. Fl. Austral. ii. 487*; *Kirk, Students' Fl. 150*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common in rivers and lakes from the Auckland Isthmus southwards, ascending to 3500 ft. November–February. Also in Australia and extra-tropical South America.

Subalpine specimens are stouter, with less delicate and more closely set submerged leaves, and the nuts are rather larger.

2. *M. intermedium*, *D.C. Prodr. iii. 69*.—Very variable in habit: in lakes and rivers forming masses of floating stems 1-4 ft. long, with numerous submerged leaves; in wet ground sometimes only an inch or two high, with the leaves all linear and entire. Leaves in whorls of 3-8, usually 4-5; submerged leaves deeply and finely pectinately pinnatifid, segments capillary; upper emerged or floral leaves much smaller, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, lanceolate and inciso-pinnatifid to narrow-linear and quite entire. Male flowers: Calyx-lobes evident. Petals white. Stamens 8. Female flowers: Calyx-lobes and petals apparently wanting. Nuts 4, very small, linear-oblong, usually minutely scabrid or almost echinate, rarely quite smooth.—*M. variæfolium*, *Hook. f. in Hook. Ic. Plant. t. 289*; *Fl. Nov. Zel. i. 64*; *Handb. N.Z. Fl. 66*; *Benth. Fl. Austral. ii. 487*; *Kirk, Students' Fl. 150*. *M. propinquum*, *A. Cunn. Precur. n. 532*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in lakes and streams, wet swamps, &c., from the North Cape southwards, ascending to 3000 ft. December–March. Also in Australia, Malaya, and India.

3. *M. robustum*, *Hook. f. Handb. N.Z. Fl. 67*.—Stems stout, erect, branched at the base, 6 in. to 2 ft. high, rarely more. Leaves

usually 5 in a whorl, 1–2 in. long, all deeply pectinately pinnatifid; upper rather coarse, usually crowded and overlapping; submerged leaves not often seen, when present with longer capillary segments. Flowers rather large, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, solitary or rarely in pairs in the axils of the floral leaves, with a pair of minute laciniate bracts at the base of each. Calyx-lobes present in both sexes, deltoid, jagged. Petals in the males only, linear-oblong. Stamens 8. Stigmas usually 4, plumose. Nuts 4, $\frac{1}{8}$ in. long, laterally compressed, usually with a single or double row of tubercles down the back, but sometimes smooth and rounded.—*Kirk, Students' Fl.* 151. *M. variæfolium* var. b, *Hook. f. Fl. Nov. Zel.* i. 64.

NORTH ISLAND: In swamps from Ahipara to the Upper Waikato, but often local; apparently rare further south. Hawke's Bay, *Colenso*! Mungaroa, Wellington, *Kirk*! SOUTH ISLAND: Awatere, *Kirk*! Moutere, Nelson, *T. F. C.*; near Westport, *Townson*! Hokitika, *Tipler*. December–February.

This is seldom found in lakes or streams, and is a marsh plant rather than a true aquatic. It often covers large stretches in swamps that are quite dry in summer.

4. *M. pedunculatum*, *Hook. f. Fl. Tasm.* i. 123, t. 23B.—Stems short, simple or sparingly branched, tufted, 1–3 in. high, usually forming broad matted patches. Leaves opposite, minute, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear or linear-spathulate, quite entire, rather fleshy. Flowers minute, usually dioecious; males shortly stalked or sessile; females sessile; bracts 2 at the base of each flower, minute, linear. Calyx-lobes 4, very minute. Petals 4, wanting in the female flowers. Stamens 8. Stigmas 4, plumose, recurved. Carpels 4, small, oblong, minutely rugose.—*Handb. N.Z. Fl.* 67; *Kirk, Students' Fl.* 151.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Cape Maria van Diemen southwards, but far from common. Sea-level to 2000 ft. December–February. Also in Australia and Tasmania.

M. verrucosum, *Lindl. in Mitch. Trop. Austral.*; *Benth. Fl. Austral.* ii. 488, is included by Mr. Kirk in the "Students' Flora" as a native of New Zealand, on the authority of specimens gathered by himself near Tauranga Harbour. These are very imperfect, having no flowers and few withered fruits; but, having compared them with authentic examples of *M. verrucosum* from Australia, I can state definitely that they are not referable to that species. They only differ from *M. intermedium* in the upper leaves being pinnatifid, and until more complete specimens are obtained are best considered as a form of that plant.

3. GUNNERA, Linn.

Stemless herbs with creeping rhizomes, often forming broad matted patches. Leaves all radical, petiolate, ovate- or rounded-cordate, coriaceous and fleshy. Flowers small, unisexual or rarely hermaphrodite, in simple or branched spikes or panicles. Male flowers: Calyx-tube imperfect or wanting; lobes 2–3, minute. Petals 2–3 or wanting. Stamens 2–3; filaments filiform; anthers large. Females: Calyx-tube ovoid; lobes 2–3, small. Petals 2–3.

or wanting. Ovary 1-celled; styles 2, rarely 4, linear, papillose, stigmatic from the base; ovule solitary, pendulous. Fruit a small fleshy or coriaceous drupe; seed adherent to the pericarp; embryo very minute.

From 20 to 25 species are known, nearly half of them being endemic in New Zealand. The remainder are chiefly found in America, ranging from Mexico to Chili, Juan Fernandez, Fuegia, and the Falkland Islands. There are also outlying species in South Africa, Java, Tasmania, and the Sandwich Islands.

The New Zealand species of *Gunnera* are very imperfectly understood, and are much in need of a thorough revision, which should be based as far as possible upon a study of the various forms in a living state. The following account, although as complete as the material at my command will permit, is deficient in many respects, and I have been compelled to omit all notice of several doubtful plants from inability to refer them to their proper places until more complete specimens are obtained. The student should be careful to gather his flowering and fruiting specimens in the same locality, and if possible from the same patch, the similarity between the foliage of several of the species making it difficult to be sure that the specimens are properly matched unless this is done. It is also much to be desired that a regular series of specimens, both flowering and fruiting, should be taken at fixed intervals during the season, there being reason to suppose that both inflorescence and fruit exhibit differences at different periods of the year.

* Scapes bisexual; female flowers at the base.

Leaves coriaceous, orbicular or reniform, crenate-dentate,

often 3-5-lobed	1. <i>G. monoica</i> .
Leaves rather thin, ovate or ovate-cordate	2. <i>G. microcarpa</i> .

** Scapes unisexual.

Slender, 1-4 in. Leaves ovate or ovate-cordate. Fruiting scape red, exceeding the leaves. Drupes obconic, $\frac{1}{2}$ in., red or yellow	3. <i>G. flavida</i> .
Tall and stout, sometimes 12 in. high. Leaves ovate or oblong. Fruiting scape equalling the leaves or longer. Drupe obconic, $\frac{1}{2}$ in., red	4. <i>G. prorepens</i> .
Leaves orbicular-cordate, sharply and minutely toothed. Scapes shorter than the leaves. Drupes $\frac{1}{10}$ in., oblong	5. <i>G. densiflora</i> .
Leaves narrow-ovate to lanceolate, acute, cuneate at the base, coarsely dentate	6. <i>G. dentata</i> .
Leaves thick and fleshy, broadly ovate, obtuse, cuneate at the base, crenate-lobed	7. <i>G. arenaria</i> .
Very stout and coriaceous. Leaves deltoid-ovate, minutely toothed, cuneate at the base	8. <i>G. Hamiltoni</i> .

1. *G. monoica*, Raoul in *Ann. Sci. Nat.* Ser. iii. 2 (1844) 117.—A slender herb with numerous creeping rhizomes and tufts of radical leaves, often forming broad matted patches, glabrous or sparsely covered with short white hairs, especially on the petioles and nerves of the leaves. Leaves $\frac{1}{3}$ –1 in. diam., orbicular or reniform, cordate or truncate at the base, obscurely 3-5-lobed and crenate, or crenate alone; petioles 1-3 in. long. Panicle very slender, 1-5 in. long, usually longer than the leaves. Male flowers occupying the upper three-quarters of the panicle, sessile or shortly pedicelled; each flower consisting of 2 stamens arising from between 2 minute

sepals, and with 1 or 2 ciliate bracts at the base of the pedicel. Females crowded at the base of the panicle. Calyx-lobes 2, linear, acute. Styles 2, very long. Fruit minute, $\frac{1}{10}$ in. diam., globose or broadly ovoid, fleshy or coriaceous, red or white.—*Raoul, Choix*, t. 8; *Hook. f. Fl. Nov. Zel.* i. 65; *Handb. N.Z. Fl.* 67; *Kirk, Students' Fl.* 152.

Var. **strigosa**, *Kirk, l.c.*—More or less clothed with copious strigose hairs, sometimes almost hoary.—*G. strigosa*, *Col. in Trans. N.Z. Inst.* xv. (1883) 322. Highly deserves varietal rank.

Var. **ramulosa**, *Kirk, l.c.*—Branches stout, much branched, clothed with the bases of the old leaves. Panicles much divided; branches often long. Flowers crowded. Fruit not known.

Var. **albocarpa**, *Kirk, l.c.*—Larger and stouter; rhizome sometimes as thick as a goose-quill. Leaves larger, sometimes $1\frac{1}{2}$ in. diam. Panicles 3–6 in., much branched; branches long. Fruit globose, white, tipped with the black calyx lobes.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in moist places from Mongonui southwards. Sea-level to 3500 ft. November–January.

The chief distinguishing characters of this species are the broad reniform or orbicular-cordate leaves, very slender bisexual panicles, and minute globose drupe. But specimens possessing these characters differ from one another considerably in size, cutting of the leaves, size of the panicle and extent to which it is divided, and the size and colour of the fruit; and I suspect that a careful study of these forms in the field will result in the species being split up into two or more.

2. **G. microcarpa**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 348.—Rhizomes slender, creeping. Leaves tufted, 2–4 in. long; petiole slender, hairy or strigose; blade about 1 in. long, broadly ovate or ovate-cordate, obtuse, crenate or crenate-lobed, both surfaces with scattered white hairs. Peduncles very slender, exceeding the leaves, 1–5 in. long, usually much branched below, rarely simple; upper two-thirds or more male, lower one-third female. Male flowers sessile on the branches or very shortly pedicelled, each with 2 narrow concave deciduous bracts. Sepals 2, minute, linear. Stamens 2; filaments often as long as the small broadly oblong obtuse anthers. Female flowers: Calyx-lobes 2, minute. Styles very long and slender, filiform. Persistent fruiting portion of the peduncle shorter than the leaves, often inclined. Drupes small, sessile, ovoid-globose, red or yellow, about $\frac{1}{10}$ in. long.—*Students' Fl.* 153. *G. mixta*, *Kirk, Students' Fl.* 152. *G. ovata*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 274 (*in part*).

SOUTH ISLAND: Otago and Southland, not uncommon, *T. Waugh! Petrie! B. C. Aston!* December–January.

Mr. Kirk's type specimens of *G. microcarpa* are in fruit only, and are few in number and otherwise imperfect. His *G. mixta* is based upon flowering specimens, to which the tall slender inflorescence gives a somewhat distinct appearance, although the leaves are identical. But the fine series of specimens in all stages of flower and fruit preserved in Mr. Petrie's herbarium prove beyond doubt that both are one and the same species. Its distinguishing characters are

the tall slender lax-flowered usually branched flowering-stems, the upper part of which is male and the lower female; the small broad anthers, on rather long filaments; and the small almost globose drupe. It is probably a widely distributed plant.

3. *G. flavida*, Col. in *Trans. N.Z. Inst.* xviii. (1886) 260.—Rhizome creeping, slender. Leaves $1\frac{1}{2}$ –3 in. long; petiole slender, glabrous or sparingly clothed with short white hairs; blade $\frac{1}{2}$ –1 in. long, ovate or elliptic-ovate or elliptic-oblong, obtuse, cordate or rounded or truncate at the base, finely crenate or sinuate-crenate or almost entire, rather membranous, glabrous or slightly hairy. Spikes unisexual. Males 1–3 in. long, rather slender; flowers lax or close together, on very short unbranched pedicels; each pedicel with a linear bract near the base, and 2 linear-cucullate deciduous bracteoles just under the flower. Sepals 2, small, narrow-linear. Stamens 2; filaments very short, almost wanting; anthers broadly ovate, apiculate. Female peduncles $\frac{1}{2}$ –1 in. long in the flowering stage; flowers crowded. Calyx-teeth 2, short. Styles 2, long. Fruiting peduncles 1–4 in. long, overtopping the leaves. Drupes $\frac{1}{8}$ in., spreading, obconic, sessile or shortly pedicelled, red or pale-yellow.—Kirk, *Students' Fl.* 153. *G. ovata*, Petrie in *Trans. N.Z. Inst.* xxv. (1893) 274 (*in part*).

NORTH ISLAND: Upper Waikato and Taupo, T. F. C.; between Taupo and Napier, Hill! Petrie! SOUTH ISLAND: Abundant in Otago and Southland, Buchanan! Petrie! Kirk! Hamilton! Sea-level to 3000 ft. December–January.

A comparison of a type specimen from Mr. Colenso with the types of Petrie's *G. ovata* prove that the two species are identical. In foliage it greatly resembles *G. microcarpa*, but the slender branched monœcious inflorescence of that species, together with the minute globose drupes, are altogether different from the short unisexual unbranched spikes of *G. flavida*, with their larger obconic fruit. *G. prorepens* only differs in the much larger size, and the two may prove to be forms of the one plant.

4. *G. prorepens*, Hook. f. *Fl. Nov. Zel.* i. 66.—A large and stout species, sometimes 12 in. high, although ordinarily less; rhizomes stout, creeping. Leaves 3–8 in. long; petioles 2–6 in., slender, glabrous or sparingly pilose; blade 1–2 in., ovate or oblong, obtuse, rounded or cordate at the base, crenulate, glabrous or slightly hairy. Flowers not seen. Fruiting peduncles usually longer than the leaves, simple, bearing many sessile lax or densely spiked drupes, which are $\frac{1}{8}$ in. long, red, fleshy, obconic or nearly globose, with an irregular deep furrow at the top from whence the styles protrude.—*Handb. N.Z. Fl.* 68 (*excl. var. b*).

NORTH ISLAND: In subalpine wet localities, Colenso! SOUTH ISLAND: West Coast, Lyall.

The only specimens I have seen that I can refer with certainty to this species are two in Mr. Colenso's herbarium. Mr. N. E. Brown has kindly compared one of them with the type at Kew, and informs me that it exactly corresponds. *G. flavida* does not seem to differ except in the smaller size of all its parts, and I should not be surprised at the two species proving to be states of one variable plant.

5. *G. densiflora*, *Hook. f. Handb. N.Z. Fl.* 68.—Forming broad matted patches. Rhizome rather stout, branched. Leaves 1–2 in. long; petioles half the length, strict, villous or glabrescent; blade $\frac{1}{2}$ –1 in. diam., orbicular or broadly ovate-orbicular, cordate at the base, sharply and minutely toothed, rather coriaceous. Spikes unisexual; males not seen; females short, concealed among the leaves. Flowers densely crowded, sessile. Calyx-lobes 2, subulate, acute. Styles 2, long, spreading. Fruiting spike shorter than the leaves. Drupes crowded, small, pendulous, $\frac{1}{10}$ in. long.—*Kirk, Students' Fl.* 154.

SOUTH ISLAND: Acheron and Clarence Rivers, altitude 4000 ft., *Travers* (*Handbook*); Craigieburn Mountains, Canterbury, *Cockayne*!

The above description is partly based upon that given in the *Handbook*, and partly upon Mr. Cockayne's specimens, which are the only ones I have seen that can be referred to the species.

6. *G. dentata*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 346.—Forming extensive patches in watery subalpine localities. Rhizome stout, much branched, clothed with the bases of the old leaves. Leaves numerous, densely tufted, 1–3 in. long; petioles long, broad and flat, usually clothed with strigose hairs, sometimes almost shaggy; blade $\frac{1}{3}$ –1 in. long, ovate or elliptic-oblong or elliptic-lanceolate, acute, rounded or cuneate at the base, often narrowed into the petiole, coarsely dentate, both surfaces with scattered white hairs or almost glabrous. Spikes unisexual. Males slender, about equalling the leaves; flowers sessile or nearly so, each with a pair of deciduous hood-shaped bracts. Sepals 2, minute, linear. Anthers broadly oblong. Female spikes very short, hidden at the base of the leaves; flowers densely crowded. Calyx-lobes 2, linear. Styles 2, very long, flattened at the base. Fruiting spikes sometimes elongated and exceeding the leaves, sometimes short and sessile among the leaves. Drupes sessile or nearly so, clavate, spreading or pendulous, $\frac{1}{10}$ in. long.—*Students' Fl.* 154. *G. prorepens* var. *b*, *Hook. f. Handb. N.Z. Fl.* 68.

NORTH ISLAND: *Colenso* (*Handbook*); Taupo, *Petrie*! SOUTH ISLAND: Subalpine localities from Nelson to Southland, but often local. 1000–3500 ft. December–February.

A distinct species, easily recognised by the narrow ovate or elliptic-oblong acute leaves, which are often cuneate at the base, and coarsely dentate.

7. *G. arenaria*, *Cheesm. ex T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 348.—A stout much-branched prostrate and matted herb, forming extensive patches in damp sandy soil; rhizome stout, clothed with the ragged bases of the old leaves. Leaves $\frac{3}{4}$ –2½ in. long, thick and coriaceous, almost fleshy; petioles long, stout, sheathing at the base, glabrous or with a few scattered flattened hairs; blade $\frac{1}{3}$ –¾ in., broadly ovate or elliptic-ovate or oblong, obtuse, cuneate at the base or truncate or almost cordate, coarsely crenate or crenate-lobed; veins prominent beneath. Peduncles variable in

size, unisexual; males usually longer than the leaves, stout, $1\frac{1}{2}$ –3 in. long. Flowers sessile or nearly so, with 1–2 linear cucullate bracts. Anthers 2, sessile, broadly oblong. Female peduncles in the flowering stage short and hidden among the leaves. Flowers densely crowded, forming a short oblong spike. Calyx-lobes 2–3, minute. Styles long, stout, subulate. Fruiting peduncles either remaining short and concealed by the leaves, or greatly elongated and exceeding them, $1\frac{1}{2}$ –3 in. long, in that case becoming stout succulent and coloured. Drupes $\frac{1}{8}$ – $\frac{1}{5}$ in. long, fleshy, yellowish-red, clavate and pendulous or obovoid and suberect.—*Kirk, Students' Fl.* 154. *G. densiflora*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 346 (*not of Hook. f.*).

NORTH ISLAND: Sand-dunes on the western coast, from Cape Maria van Diemen to Port Waikato, *T. F. C.*, *Petrie!* *R. H. Matthews!* *H. Carse!* SOUTH ISLAND: Nelson—Cape Farewell, *Kirk!* Canterbury—New Brighton, *Cockayne*; Seventy-mile Beach, *Buchanan!* Southland—Sandy Point, *T. Waugh!*

Allied to *G. dentata*, but easily separated by the stouter and more glabrous habit, broader rounder and more fleshy obtuse leaves, stouter peduncles, and larger fruit.

8. **G. Hamiltoni**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 347.—A stout coriaceous much-branched plant forming broad matted patches; rhizomes as thick as a goose-quill. Leaves numerous, tufted, forming broad flat rosettes 2–4 in. diam., coriaceous; petioles broad and flat, almost winged, sheathing at the base, glabrous or slightly villous; blade $\frac{1}{2}$ –1 in. long, ovate or ovate-deltoid, cuneate at the base, acute, closely and minutely toothed, glabrous; veins prominent below. Spikes unisexual; males stout; flowers lax, sessile. Female spikes at first hidden among the leaves; flowers crowded; bracts broadly ovate, laciniate. Fruiting spikes 2–4 in. long; drupes fleshy, clavate, red.—*Students' Fl.* 155.

SOUTH ISLAND: Hills near the mouth of the Oreti River, Southland, *W. S. Hamilton!* STEWART ISLAND: Mason Bay, *W. Traill.*

A very remarkable plant, quite unlike any other, although undoubtedly allied to *G. arenaria*. I have only seen very fragmentary flowering specimens.

4. **CALLITRICHE**, Linn.

Perfectly glabrous slender herbs, usually growing in wet places, often aquatic. Leaves opposite, linear or obovate-spathulate, quite entire, the upper ones often crowded or rosulate. Flowers monœcious, minute, axillary, solitary or rarely a male and female in the same axil, without perianth. Male flowers of a single stamen subtended by two minute bracts; filaments slender, elongated; anther 2-celled, cells confluent above. Female flowers with or without the 2 bracts. Ovary sessile or shortly stalked, 4-celled; ovules solitary in each cell; styles 2, elongated, stigmatic throughout their length. Fruit flattened, indehiscent, 4-lobed and 4-celled, ultimately separating into 4 1-seeded carpels.

A genus of very doubtful affinity, now often placed in the vicinity of the *Euphorbiaceæ*. The species are estimated at from 1 or 2 to 20 or 30, according to the different views of authors.

Fruits not winged, edges almost obtuse, groove between the carpels shallow	1. <i>C. antarctica</i> .
Fruits slightly winged, edges sharply keeled, groove between the carpels rather shallow	2. <i>C. verna</i> .
Fruits broadly winged, wings pale, groove between the carpels deep	3. <i>C. Muelleri</i> .

1. *C. antarctica*, *Engelm. ex Hegelm. in Verh. Bot. Ver. Brandenburg. ix.* (1867) 20.—Stems creeping and rooting, rather stout, succulent, densely matted, 2–6 in. long. Leaves fleshy, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, narrow obovate-spathulate or oblong-spathulate, rounded at the tip, narrowed into a rather long petiole. Fruit sessile, broadly oblong or almost orbicular, somewhat turgid, not winged, the edges subacute or almost obtuse, separated by a shallow groove, so that each pair of lobes is united by almost three-quarters of their faces.—*Kidder in Bull. U.S. Nat. Mus.* iii. 23; *Kirk, Students' Fl.* 156. *C. verna*, var. *b* *terrestris*, *Hook. f. Fl. Antarct.* i. 11.

THE SNARES, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, MACQUARIE ISLAND: Not uncommon on damp soil. Also found on Kerguelen Island, the Falkland Islands, and South Georgia.

2. *C. verna*, *Linn. Fl. Suec.* ii. n. 3.—Usually floating in still water. Stems slender, sparingly branched, 3–12 in. long. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in. long, linear-spathulate or oblong-spathulate or obovate, rounded or retuse at the tip, very thin and membranous. Fruit sessile, rather longer than broad, subcordate, somewhat convex, edges shortly and acutely keeled, groove between the lobes rather shallow.—*Hook. f. Fl. Nov. Zel.* i. 64; *Handb. N.Z. Fl.* 68 (*in part*); *Kirk, Students' Fl.* 156.

NORTH AND SOUTH ISLANDS: Not uncommon in streams and lakes throughout. An abundant plant in many temperate countries.

3. *C. Muelleri*, *Sond. in Linnæa* xxviii. (1886) 229.—Stems filiform, 2–9 in. long, much branched and interlaced, forming broad matted patches on damp soil. Leaves obovate-rhomboid or broadly obovate-spathulate, cuneate at the base, suddenly narrowed into a distinct petiole. Fruit orbicular-obcordate, often broader than long, flattened, margins expanded into a broad pale wing, groove between the lobes deep.—*Kirk, Students' Fl.* 156. *C. verna* var. *b*, *Hook. f. Fl. Nov. Zel.* i. 64. *C. macropteryx*, *Hegelm. Monog. Callit.* 59, t. iv. f. 2. *C. microphylla*, *Col. in Trans. N.Z. Inst.* xx. (1888) 190.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Common from the North Cape southwards. Sea-level to 2500 ft. Also in Australia.

There seem to be two forms of this—one with a broad wing occupying a third of the whole width of the fruit, the other with a much narrower wing. The last-mentioned form was referred by Mr. Kirk to *C. obtusangula*, Hegelm, Monog. Callit. 54, t. 3, f. 3, but this determination is clearly erroneous, the true *obtusangula* having rounded angles to the fruit, which is not at all winged.

ORDER XXVIII. MYRTACEÆ.

Trees or shrubs, sometimes climbing. Leaves opposite, more rarely alternate or whorled, simple and entire, usually dotted with pellucid oil-glands and with a vein running parallel to the margin. Stipules generally absent. Flowers regular, usually hermaphrodite, solitary and axillary, or in axillary or terminal cymes panicles or racemes. Calyx-tube adnate to the ovary up to the insertion of the stamens, limb 4-5 or many-cleft or -partite, persistent or deciduous, imbricate or valvate, sometimes entire or closed in bud. Petals as many as the calyx-lobes, rarely wanting, inserted on a disc lining the calyx-tube. Stamens usually numerous, inserted on the disc with the petals; filaments free or connate at the base or united into separate bundles; anthers small, roundish. Ovary inferior or semi-inferior, crowned by a fleshy disc, sometimes 1-celled with 1 or few ovules, more often 2- to many-celled with numerous ovules; style simple; stigma capitate. Fruit either crowned by the persistent calyx-limb or marked by its scar when deciduous, usually a capsule loculicidally dehiscent into as many valves as cells, or a 1- to many-seeded berry, more rarely dry and indehiscent. Seeds angular or compressed or cylindrical; albumen usually wanting.

A very large and distinct order, readily recognised by the opposite exstipulate entire leaves, furnished with a marginal vein, and filled with transparent oil-glands. The species are mainly tropical or subtropical; most abundant in South America and Australia, much less common in Asia and Africa; more frequent in the south temperate zone than in the north, where they are decidedly rare. Genera about 80; species probably not exceeding 1800. The order includes many plants of economic importance. Some produce valuable spices, as cloves, allspice; or edible fruits, as the guava, the rose-apple, brazil-nuts, &c.; others yield aromatic essential oils, as eucalyptus, cajeput, &c. The bark of most of the species is more or less astringent. Some of the species of *Eucalyptus* attain a height of over 400 ft., being probably the tallest trees in the world. Of the four New Zealand genera, *Leptospermum* extends through Australia as far as the Malay Archipelago; *Metrosideros* occurs in the Pacific and Malayan Islands, Australia, and South Africa; *Eugenia* is mainly tropical; and *Myrtus* mostly American.

* Fruit capsular.

Leaves small, alternate. Flowers solitary or fascicled ..	1. LEPTOSPERMUM.
Leaves larger, opposite. Flowers usually handsome, cymose	2. METROSIDEROS.

** Fruit a berry.

Flowers usually solitary. Embryo curved, with a long radicle	3. MYRTUS.
Flowers cymose. Embryo thick and fleshy, radicle short ..	4. EUGENIA.

1. **LEPTOSPERMUM**, Forst.

Shrubs or small trees, glabrous or silky-pubescent. Leaves small, alternate, entire. Flowers solitary or 2-3 together, axillary or at the ends of the branchlets, often polygamous. Calyx-tube campanulate or turbinate, adnate to the ovary below; lobes 5. Petals 5, spreading. Stamens numerous, free, in a single series; anthers versatile. Ovary inferior or half-superior, enclosed in the calyx-tube, 5- or more-celled, rarely 3-4-celled; style filiform; stigma capitate or peltate. Capsule woody or coriaceous, exceeding the calyx-tube or altogether included in it, opening loculicidally at the top. Seeds numerous in each cell, but most of them sterile, pendulous, linear or angular.

A genus of about 28 species, almost wholly Australian; a few only in New Zealand, New Caledonia, and the Malay Archipelago. One of the New Zealand species is also found in Australia, the remaining two are endemic.

Leaves pungent. Flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., solitary. Calyx-lobes deciduous. Capsule half-exserted	.. ..	1. <i>L. scoparium</i> .
Leaves not pungent. Flowers $\frac{1}{2}$ in. diam., usually fascicled. Calyx-lobes persistent. Capsule included in the calyx-tube	.. ..	2. <i>L. ericoides</i> .
Leaves not pungent, white with silky hairs. Flowers $\frac{1}{2}$ in. diam. Calyx-lobes persistent. Capsule deeply sunk within the calyx-tube	.. ..	3. <i>L. Sinclairii</i> .

1 ***L. scoparium***, Forst. *Char. Gen.* 72, t. 36.—A shrub or small tree, extremely variable in size, usually 6–18 ft. high, but sometimes dwarfed to a foot or two, occasionally reaching 20–25 ft. with a trunk 12–18 in. diam.; branches fastigiate or spreading; branchlets and young leaves silky. Leaves $\frac{1}{6}$ – $\frac{1}{2}$ in. long, variable in shape, linear or linear-lanceolate to broadly ovate, sessile, rigid, concave, acute and pungent-pointed, veinless, dotted, erect or spreading, rarely recurved. Flowers sessile, solitary, axillary or terminating the branchlets, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. Calyx-tube broadly turbinate; lobes orbicular, deciduous. Petals orbicular, slightly clawed. Capsule woody, persistent, half sunk in the calyx-tube, which forms a rim round it, the free portion 5-valved.—*A. Rich. Fl. Nov. Zel.* 337; *A. Cunn. Precur.* n. 553; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 69; *Handb. N.Z. Fl.* 69; *Kirk, Forest Fl.* t. 117; *Students' Fl.* 157.

Var. ***linifolium***, *Hook. f. Fl. Nov. Zel.* i. 69.—Leaves narrow linear-lanceolate.

Var. ***myrtifolium***, *Hook. f. l.c.*—Leaves ovate, spreading or recurved.

Var. ***parvum***, *Kirk, Students' Fl.* 158.—1-3 ft. high. Leaves $\frac{1}{8}$ in. long, ovate, spreading. Flowers smaller, $\frac{1}{8}$ – $\frac{1}{4}$ in.

Var. ***prostratum***, *Hook. f. l.c.*—Small, often prostrate, branches ascending at the tips. Leaves ovate or almost orbicular, recurved. A mountain form.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 3500 ft. *Manuka*; *Tea-tree*. October–April. Also plentiful in Australia and Tasmania.

Too well known to need comment here. The wood is dark-red, hard and durable, and is applied to a variety of purposes, but can seldom be obtained of large size. An infusion of the leaves has been used in the place of tea.

2. **L. ericoides**, *A. Rich. Fl. Nouv. Zel.* 338.—A shrub or tree 20–60 ft. high, with a trunk 1–3 ft. diam.; bark loose, papery; branchlets slender, glabrous or the younger sparingly silky. Leaves fascicled or alternate, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, very narrow-linear or linear-lanceolate, sometimes narrow linear-spathulate, acute but not pungent, concave, veinless, dotted, glabrous or slightly silky; margins often ciliate when young. Flowers $\frac{1}{8}$ – $\frac{1}{4}$ in. diam., axillary, solitary or fascicled, usually produced in great profusion; pedicels short, glabrous or silky. Calyx-tube turbinate; lobes ovate, acute, persistent. Petals orbicular, shortly clawed. Capsule small, turbinate, wholly included within the calyx-tube.—*A. Cunn. Precur.* n. 554; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 70; *Handb. N.Z. Fl.* 70; *Kirk, Forest Fl.* t. 69; *Students' Fl.* 158.

Var. **lineatum**, *Kirk, l.c.*—Smaller and more slender, 2–12 ft. high, usually more silky. Leaves narrower, $\frac{1}{30}$ – $\frac{1}{20}$ in. broad. Flowers smaller, $\frac{1}{8}$ in. diam.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape to the Bluff, ascending to 3000 ft. Var. *lineatum*, from the North Cape to the Auckland Isthmus. *Kanuka*; *Maru*. November–January.

Easily distinguished from the preceding by its greater size, narrower leaves, smaller flowers, and much smaller capsules, which are entirely included in the calyx-tube. Wood durable; much used for piles, house-blocks, posts and rails, &c.

3. **L. Sinclairii**, *T. Kirk, Students' Fl.* 158.—A small prostrate or suberect shrub 1–5 ft. high; branches spreading; young shoots, leaves, pedicels, and calyces hoary with appressed silky hairs. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-lanceolate or oblong-lanceolate, acute, flat or concave. Flowers larger than in *L. ericoides*, $\frac{1}{4}$ in. diam., on longer pedicels, often crowded towards the ends of the branchlets, forming rounded heads. Calyx-tube narrow-turbinate; lobes oblong or ovate, acute or obtuse, persistent. Petals obovate, clawed. Capsule narrow-turbinate, more deeply sunk within the calyx-tube than in *L. ericoides*.

NORTH ISLAND: Three Kings Islands, *T. F. C.*; Great Barrier Island, *Hutton* and *Kirk*! Sea-level to 1800 ft. November–January.

This is very close to *L. ericoides*. Its distinguishing characters are the smaller size, broader and flatter silky-hoary leaves, larger flowers, and more deeply sunk capsules.

2. METROSIDEROS, Banks.

Erect or climbing trees or shrubs. Leaves opposite, sometimes distichous, coriaceous. Flowers often handsome, white or red or crimson, usually disposed in terminal cymes or racemes. Calyx-tube adnate to the base of the ovary, campanulate, turbinate or urceolate; lobes 5, imbricate. Petals 5, spreading. Stamens very numerous, much longer than the petals; filaments filiform; anthers

versatile. Ovary inferior or half-superior, 3-celled; style filiform; stigma small; ovules numerous in each cell. Capsule coriaceous, altogether enclosed in the persistent calyx-tube or protruding beyond it, 3-celled, loculicidally 3-valved or irregularly dehiscent. Seeds numerous, densely packed, linear; testa membranous.

In addition to the 11 species found in New Zealand, all but one of which are endemic, there are a few scattered through Polynesia, New Caledonia, Australia, and the Malay Archipelago, together with an aberrant species in South Africa. New Zealand is the only country which possesses climbing species.

* Capsule coriaceous or woody, wholly enclosed in the calyx-tube, which is produced far beyond it, dehiscing irregularly or by 3 apical valves.

- | | |
|---|----------------------------|
| Climbing. Leaves obtuse. Calyx glabrous. Capsule large, $\frac{1}{2}$ – $\frac{3}{4}$ in. | 1. <i>M. florida</i> . |
| Erect, 30–60 ft. Leaves elliptic-lanceolate, acute or acuminate. Calyx silky. Capsule $\frac{1}{2}$ in. | 2. <i>M. lucida</i> . |
| A much-branched shrub. Leaves ovate-lanceolate, acute. Cymes usually on the old wood below the leaves | 3. <i>M. Parkinsonii</i> . |

** Capsule hardly coriaceous, wholly enclosed in the calyx-tube, which is produced far beyond it, dehiscing to the base. All climbers.

- | | |
|--|------------------------------|
| Leaves decussate, large, $1\frac{1}{2}$ –3 in., acute or acuminate. Flowers large, white, terminal | 4. <i>M. albiflora</i> . |
| Leaves decussate, smaller, $\frac{3}{4}$ – $1\frac{1}{2}$ in., obtuse. Flowers crimson | 5. <i>M. diffusa</i> . |
| Leaves distichous, subacute. Branchlets glabrescent. Flowers always lateral | 6. <i>M. hypericifolia</i> . |
| Leaves distichous, acuminate. Branchlets pubescent. Flowers usually terminal | 7. <i>M. Colensoi</i> . |

*** Capsule exserted beyond the calyx-tube, the free portion 3-valved.

- | | |
|---|--------------------------|
| Erect. Leaves decussate, glabrous, obtuse, 1 – $1\frac{1}{2}$ in. long | 8. <i>M. robusta</i> . |
| Erect. Leaves decussate, white with appressed tomentum beneath, 2–4 in. long | 9. <i>M. tomentosa</i> . |
| Erect. Leaves decussate, white with appressed tomentum beneath, $\frac{3}{4}$ –2 in. long | 10. <i>M. villosa</i> . |
| Climbing. Leaves distichous, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Flowers white | 11. <i>M. scandens</i> . |

1. *M. florida*, Sm. in *Trans. Linn. Soc.* iii. (1797) 269.—Usually a tall woody climber, reaching the tops of lofty trees; stems long, cable-like, often 3–6 in. diam.; bark loose, separating in large flakes. Leaves $1\frac{1}{2}$ –3 in. long, shortly petioled, elliptic-oblong, obtuse, coriaceous, glabrous; midrib stout. Flowers orange-red, in few- or many-flowered terminal simple or branched cymes. Calyx obconic or turbinate, glabrous, produced beyond the ovary. Petals orbicular, yellowish-red. Stamens scarlet, very numerous, $\frac{3}{4}$ –1 in. long. Ovary completely adnate with the base of the calyx-tube, 3-celled. Capsule deeply sunk within the persistent calyx, and with it forming a woody urceolate 5-ribbed fruit $\frac{1}{2}$ – $\frac{3}{4}$ in. long, usually dehiscing by 3 valves within the calyx.—*A. Rich. Fl. Nouv. Zel.* 333; *A. Cunn. Precur.* n. 559; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 66, t. 15; *Handb. N.Z. Fl.* 70; *Kirk, Forest*

Fl. t. 127; *Students' Fl.* 160. *M. speciosa*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 463. *M. aurata*, *Col. l.c.* xxiii. (1891) 385. *Melaleuca florida*, *Forst. Prodr.* n. 214. *Leptospermum scandens*, *Forst. Char. Gen.* 72.

NORTH AND SOUTH ISLANDS: Common from the Three Kings Islands and the North Cape to Nelson and Marlborough. Sea-level to 2500 ft. *Aka.* February–June.

According to Mr. J. W. Hall, the capsules require a whole year to ripen their seeds. Mr. Colenso's *M. aurata*, which is kept up as a variety by Mr. Kirk, only differs in the yellow flowers. It has been noticed in several districts from Auckland to Collingwood, but not more than a single specimen has been found in each locality. It can only be considered an accidental sport.

2. *M. lucida*, *A. Rich. Fl. Nouv. Zel.* 333.—Usually a tall erect branching tree 30–60 ft. high, but often dwarfed to a small bush in subalpine or exposed localities; bark pale, papery; branchlets and young leaves silky. Leaves $1\frac{1}{2}$ –3 in. long, elliptic-lanceolate or lanceolate, acuminate, very coriaceous, pale glossy-green above, dotted with oil-glands beneath, narrowed into a short stout petiole. Flowers bright-crimson, in short broad cymes at the ends of the branches; peduncles and pedicels short, stout, silky. Calyx obconic, silky; lobes 5, ovate, obtuse. Petals oblong, exceeding the calyx-lobes. Stamens numerous, 1 in. long. Ovary sunk in the calyx-tube, 3-celled. Capsule $\frac{1}{3}$ in. long, coriaceous, broadly urceolate, obscurely 5-ribbed, crowned by the persistent cup-shaped calyx-limb.—*A. Cunn. Precur.* n. 561; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 67; *Handb. N.Z. Fl.* 71; *Kirk, Forest Fl.* t. 58; *Students' Fl.* 160. *M. umbellata*, *Cav. Ic.* iv. 20, t. 337. *Agalmanthus umbellatus*, *Homb. & Jacq. Voy. Astrol. et Zél.* 78. *Melaleuca lucida*, *Forst. Prodr.* n. 216.

NORTH ISLAND: In hilly or mountain districts from Whangarei and the Great and Little Barrier Islands southwards, but often local. SOUTH ISLAND, STEWART ISLAND, AUCKLAND ISLANDS: Abundant throughout. CAMPBELL ISLAND: Rare. Sea-level to 3500 ft. *Mountain-rata.* December–January.

Wood extremely strong, hard, heavy, and durable; useful for shipbuilding, &c.

3. *M. Parkinsonii*, *Buch. in Trans. N.Z. Inst.* xv. (1883) 339, t. 28, f. 2.—A much-branched shrub with straggling often prostrate branches, or a small tree 20–30 ft. high; trunk seldom more than 6–9 in. diam. Leaves 1–3 in. long, ovate-lanceolate to oblong-lanceolate or elliptic-ovate, acute or acuminate, rounded at the base, coriaceous, quite glabrous; petioles very short. Flowers bright-crimson, usually in dense paniculate cymes springing from the branches below the leaves, but sometimes terminating the branchlets as well. Calyx-tube turbinate, glabrous; lobes 5, ovate, triangular, obtuse. Stamens 1 in. long. Ovary sunk in the calyx-tube, 3-celled. Capsule $\frac{1}{4}$ in. long, coriaceous, broadly campanulate, obscurely 5-ribbed, crowned by the persistent cup-shaped calyx-limb.—*Kirk, Students' Fl.* 160.

SOUTH ISLAND: Nelson—Wakamarina Ranges, near Collingwood; Anatori Ranges; Heaphy River, *W. S. Hayward!* *J. Dall!* Buller Valley, Nine-mile Creek, *R. J. Kingsley!* Mount Rochfort, not uncommon, altitude 1000–2500 ft., *W. Townson!* Sea-level to 3000 ft. December–January.

A very handsome plant, which has the most restricted range of any of the New Zealand species.

4. *M. albiflora*, *Sol. ex Gært.* *Fruct.* i. 172, t. 34, f. 11.—A much-branched woody climber, glabrous in all its parts; branchlets terete, slender, often drooping. Leaves decussate, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, elliptic-lanceolate or elliptic-ovate, acute or acuminate, glossy above, very coriaceous, narrowed at the base into a short stout petiole. Flowers white, in terminal much-branched paniculate cymes; pedicels pubescent. Calyx narrow-campanulate or almost tubular; lobes 5, ovate, obtuse, persistent. Petals exceeding the calyx-lobes, white, orbicular. Stamens and style filiform, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Ovary adnate to the base of the calyx, 3-celled. Capsule $\frac{1}{4}$ – $\frac{1}{3}$ in. long, splitting to the base into 3 valves when mature, urceolate, globose and 3-lobed below, crowned by the much narrower tubular calyx, the lobes of which are sharply reflexed at the top.—*Hook. f. Fl. Nov. Zel.* i. 67; *Handb. N.Z. Fl.* 71; *Kirk, Students' Fl.* 161. *M. diffusa*, *A. Cunn. Precur.* n. 560 (not of Smith); *Hook. Ic. Plant.* t. 569.

NORTH ISLAND: Forests from Mongonui and Hokianga southwards to the East Cape, but often local. Ascends to 2800 ft. December–January.

A very handsome species, easily recognised by the large broad leaves and large panicles of white flowers.

5. *M. diffusa*, *Sm. in Trans. Linn. Soc.* iii. (1797) 268.—A tall and stout woody climber reaching the tops of the highest trees; young branchlets, inflorescence, and calyces pubescent or setose. Leaves $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, very shortly petioled, elliptic-oblong or ovate-oblong or ovate, obtuse or subacute, very coriaceous. Flowers very abundantly produced, bright-crimson, in terminal or rarely axillary much-branched cymes. Calyx-tube narrow-oblong, suddenly expanded into a broad cup-shaped limb; lobes 5, broadly oblong, persistent. Petals orbicular, shortly clawed; margins usually fimbriate or jagged. Ovary wholly adnate to the base of the calyx-tube. Capsule $\frac{1}{3}$ in. long, globose, rather coriaceous, 3- or 6-ribbed, 3-celled, loculicidally dehiscing to the base, crowned by the short cup-shaped calyx-limb.—*Hook. f. Fl. Nov. Zel.* i. 67; *Handb. N.Z. Fl.* 71; *Kirk, Students' Fl.* 161.

NORTH ISLAND: Not uncommon in forests from Mongonui and Ahipara to the East Cape and Taranaki. Sea-level to 2000 ft. September–October.

A most brilliant plant when in full bloom, well worthy of cultivation.

6. *M. hypericifolia*, *A. Cunn. Precur.* n. 562.—A climbing shrub; branches slender, spreading, obscurely tetragonous, usually minutely pubescent. Leaves distichous, $\frac{1}{3}$ –1 in. long, oblong-lanceolate or ovate-lanceolate or ovate-oblong, acute or apiculate or

obtuse, rounded at the base, sessile, rather membranous, glabrous or slightly silky when young. Flowers small, pink or whitish-pink, in small lateral few-flowered cymes or racemes; pedicels slender, glabrous or pubescent. Calyx-tube pyriform, suddenly expanded into a short and broad cup-shaped limb; lobes 5, ovate-triangular. Petals orbicular, shortly clawed, exceeding the calyx-lobes. Stamens slender, $\frac{1}{3}$ in. long. Ovary wholly adnate to the base of the calyx-tube. Capsule small, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, globose, 3-lobed, crowned by the funnel-shaped calyx-limb, loculicidally 3-valved to the base.—*Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 67, t. 16; *Handb. N.Z. Fl.* 71; *Kirk, Students' Fl.* 161. *M. subsimilis*, *Col. in Trans. N.Z. Inst.* xii. (1880) 361.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in forests from the North Cape southwards. Sea-level to 2000 ft. November–January.

The smallest species of the genus. The flowers are occasionally quite white, and are always produced on the old wood, never terminal.

7. *M. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 68.—A slender climbing shrub with numerous very slender leafy terete or obscurely tetragonous branches; branchlets densely pubescent or setose. Leaves distichous, often imbricating, sessile or very shortly petioled, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, ovate or ovate-lanceolate, acute or acuminate, rounded at the base, almost membranous, densely pubescent when young, often becoming almost glabrous when mature. Flowers small, pink or whitish, in terminal or lateral trichotomous cymes which are rarely more than $1\frac{1}{2}$ in. long; peduncles and pedicels silky-pubescent. Calyx-tube funnel-shaped, much longer than the ovary, pubescent; lobes small, narrow-triangular, acute, as long as or slightly longer than the small orbicular petals. Ovary wholly adnate to the base of the calyx-tube. Capsule small, $\frac{1}{6}$ – $\frac{1}{5}$ in. long, globose, 3-lobed, crowned by the long funnel-shaped calyx-limb, loculicidally 3-valved to the base.—*Handb. N.Z. Fl.* 72; *Kirk, Students' Fl.* 162.

Var. *pendens*, *Kirk, l.c.*—Branchlets much more slender, almost filiform, pendulous. Flowers white.—*M. pendens*, *Col. in Trans. N.Z. Inst.* xii. (1880) 360.

NORTH AND SOUTH ISLANDS: In forests from the Bay of Islands (Handbook) to Nelson and Marlborough, but far from common. December–January.

Allied to the preceding species, but easily distinguished by the much more slender habit, pubescent branchlets, and by the thinner much more acuminate and usually pubescent leaves. I have seen no specimens from the north of the Waikato River.

8. *M. robusta*, *A. Cunn. Precur.* n. 557.—A tall and stout forest-tree, 60–80 or even 100 ft. high; trunk irregular, 3–8 ft. diam. or more; branches spreading, forming a huge rounded head; branchlets 4-angled, puberulous. Leaves decussate, 1 – $1\frac{1}{2}$ in. long, elliptic-oblong or ovate-oblong or elliptic-lanceolate, obtuse, glabrous,

very coriaceous; petioles short, stout, glabrous or puberulous. Flowers dark-scarlet, very abundantly produced, in broad and dense terminal many-flowered cymes; peduncles and pedicels short, stout, pubescent. Calyx-tube short, obconic; lobes short and broad, triangular. Petals exceeding the calyx-lobes, orbicular. Ovary adnate to the base of the calyx-tube and included within it during the flowering stage. Capsule small, oblong, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, half-superior, girt round the middle by the rim of the calyx-tube, the free upper part loculicidally 3-valved.—*Hook. f. Fl. Nov. Zel.* i. 68, t. 17; *Handb. N.Z. Fl.* 72; *Kirk, Forest Fl.* t. 128; *Students' Fl.* 162. *M. florida*, *Hook. Bot. Mag.* t. 4471 (not of Smith).

Var. *retusa*, *Kirk, l.c.*—Leaves shorter, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, elliptic, rounded at both ends, retuse.—Two specimens in Mr. Kirk's herbarium, from Lowry Bay, Wellington.

NORTH AND SOUTH ISLANDS: Abundant in forests from the North Cape southwards to Marlborough, Nelson, and Westland. Sea-level to 3000 ft. *Rata*. December–January.

A magnificent tree, sometimes reaching a gigantic size, specimens having been measured with trunks over 20 ft. diam. It usually (but not invariably) commences life as an epiphyte in the upper branches of some tall forest-tree, sending to the ground aerial roots, which coalesce and form a trunk after the death of the supporting plant. Terrestrial specimens are frequently seen, but these either have no trunk at all, keeping during life the habit of a much-branched bushy shrub, or produce a short, straight trunk of no great size. The timber is strong, hard, and durable, and is much employed for wheel-wrighs' work, framework for machinery, wagons, &c., and for shipbuilding.

9. *M. tomentosa*, *A. Rich. Fl. Nouv. Zel.* 336, t. 37.—Usually a much-branched tree 30–70 ft. high, with a short stout trunk 2–5 ft. diam., and large wide-spreading branches, but sometimes dwarfed to a few feet in height; branchlets stout, terete, tomentose. Leaves decussate, very variable in size and shape, 1–4 in. long, lanceolate or elliptic-lanceolate to oblong or broadly oblong, acute or obtuse, rounded at the base, very thick and coriaceous, usually clothed with white tomentum beneath, rarely glabrous; margins flat or recurved; petioles short, stout. Flowers large, dark-crimson, in broad terminal many-flowered cymes; peduncles and pedicels stout, and with the calyces clothed with dense white tomentum. Calyx-tube obconic; lobes short, deltoid. Petals oblong, obtuse, exceeding the calyx-tube. Stamens numerous, $1\frac{1}{4}$ – $1\frac{1}{2}$ in. long. Ovary 3-celled, adnate to the base of the calyx-tube, and sunk within it during the flowering stage. Capsule $\frac{1}{3}$ in. long, half-superior, woody, tomentose, girt round the middle by the persistent calyx-limb, the free upper part loculicidally 3-valved.—*A. Cunn. Precur.* n. 558; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 68; *Handb. N.Z. Fl.* 72; *Kirk, Forest Fl.* t. 118; *Students' Fl.* 163.

NORTH ISLAND: Abundant along the coast from the Three Kings Islands and the North Cape to Poverty Bay and Urenui (Taranaki). Inland at Lake Tarawera, Lake Taupo, and Waikaremoana. Sea-level to 2000 ft. *Pohutukawa*; *Christmas-tree*. December–January.

A noble and picturesque tree, very abundant on the rocky cliffs and headlands of the northern portion of the North Island. Banks and Solander recorded it from Totaranui (Queen Charlotte Sound) in the South Island; but this is probably an error. The wood is largely employed for shipbuilding and other purposes requiring strength, hardness, and durability.

10. *M. villosa*, Sm. in *Trans. Linn. Soc.* iii. (1797) 268.—A much-branched tree 20–60 ft. high, trunk 1–4 ft. diam.; branchlets, undersurface of leaves, inflorescence, and calyces densely covered with white tomentum. Leaves decussate, $\frac{3}{4}$ –2 in. long, broadly ovate or broadly oblong, sometimes almost orbicular, obtuse at both ends, very coriaceous; margins recurved; petioles short, stout. Flowers scarlet, in small terminal many-flowered cymes; peduncles and pedicels short, stout. Calyx-tube broadly obconic; lobes short, deltoid, with a gland at the tip. Petals broadly oblong, exceeding the calyx-lobes. Stamens $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Ovary 3-celled, adnate to the base of the calyx-tube. Capsule $\frac{1}{4}$ in. long, half-superior, woody, tomentose, girt at the middle by the persistent calyx-limb, the free portion loculicidally 3-valved.—*Kirk, Students' Fl.* 163. *M. polymorpha*, Gaud. in *Freye. Voy. Bot.* 482, t. 85; *Hook. f. Handb. N.Z. Fl.* 73; *Kirk, Forest Fl.* t. 119.

KERMADEC ISLANDS: Sunday Island, the most abundant tree, ascending to the tops of the hills, altitude 1700 ft. August–December.

A common plant in many of the Polynesian islands, varying greatly in size, shape of the leaves, presence or absence of tomentum, &c. The above description refers solely to the Kermadec Island variety.

11. *M. scandens*, Sol. ex Gært. *Fruct.* i. 172, t. 34, f. 10.—A tall woody climber, reaching the tops of the highest trees; branches numerous, spreading, terete; branchlets tomentose or setose. Leaves distichous, sessile, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, broadly ovate or broadly oblong to orbicular, obtuse, very coriaceous, glabrous and shining above; paler, glandular-punctate and often pilose beneath; margins recurved. Flowers small, white, in pedunculate 3-flowered cymes crowded towards the ends of the branches, forming a leafy terminal panicle; peduncles and pedicels pubescent. Calyx-tube short, broadly turbinate; lobes short and broad, obtuse, persistent. Petals orbicular, white. Stamens slender, $\frac{1}{3}$ in. long. Ovary 3-celled, adnate to the base of the calyx-tube, and sunk in it during the flowering stage. Capsule globose, $\frac{1}{6}$ in. diam., half-superior, girt round the middle by the persistent calyx-limb, the free portion loculicidally 3-valved.—*Hook. f. Fl. Nov. Zel.* i. 69; *Handb. N.Z. Fl.* 73; *Kirk, Students' Fl.* 163. *M. perforata*, A. Rich. *Fl. Nouv. Zel.* 334. *M. buxifolia*, A. Cunn. *Precur.* n. 556; *Hook. Bot. Mag.* t. 4515. *M. vesiculata*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 327. *M. tenuifolia*, Col. *l.c.* xxiv. (1892) 386. *Melaleuca perforata*, *Forst. Prodr.* n. 212. *Leptospermum perforatum*, *Forst. Char. Gen.* 72.

NORTH AND SOUTH ISLANDS: Abundant in forests from the Three Kings Islands and North Cape to Marlborough and Nelson. Sea-level to 2000 ft. *Aka*. January–March.

I have seen no specimens from further south than Marlborough, but it has been recorded from Banks Peninsula and the Auckland Islands, I believe erroneously. Mr. Colenso's *M. tenuifolia*, as proved by the type specimens in his herbarium, is based upon the young plant, which has slender glabrous stems and almost membranous leaves. His *M. vesiculata* is a state in which the glands on the undersurface of the leaves and calyces are more conspicuous than usual.

3. MYRTUS, Linn.

Shrubs or rarely trees, glabrous or pubescent or tomentose. Leaves opposite, often coriaceous, pellucid-dotted. Flowers axillary, solitary or in few-flowered cymes. Calyx-tube subglobose or turbinate; lobes 4–5, usually persistent. Petals 4–5, spreading. Stamens very numerous, in many series, free, longer than the petals. Ovary inferior, completely or imperfectly 2–3-celled; ovules numerous in each cell. Fruit a globose or ovoid berry, crowned with the persistent calyx-limb. Seeds few or many, reniform or almost globose; testa crustaceous or bony. Embryo terete, curved or annular; cotyledons small; radicle long.

Species about 100, most of them natives of South America, a few extending to Mexico and the West Indies. There are also 9 or 10 Australian species, and 1 (the common myrtle) widely spread over southern Europe and western Asia. The 4 New Zealand species are all endemic.

Leaves 1–2 in. long, tumid between the veins	..	..	1. <i>M. bullata</i> .
Leaves $\frac{3}{4}$ –1 in. long, flat	..	..	2. <i>M. Ralphi</i> .
Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., obcordate. Calyx 4-lobed	..	..	3. <i>M. obcordata</i> .
Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., obovate. Calyx 5-lobed..	..	..	4. <i>M. pedunculata</i> .

1. *M. bullata*, Sol. ex A. Cunn. *Precur.* n. 565.—An erect shrub, usually from 10 to 15 ft., but sometimes taller and becoming a small tree 20–25 ft. high; branchlets and young leaves tomentose. Leaves 1–2 in. long, reddish-brown, shortly petioled, broadly ovate or orbicular-ovate, obtuse or acute or apiculate, coriaceous, the surface tumid or blistered between the veins. Flowers axillary, solitary, $\frac{1}{2}$ in. diam., white. Peduncles longer or shorter than the leaves, tomentose. Calyx 2-bracteolate at the base; lobes 4, obtuse or subacute. Petals orbicular, white. Berry $\frac{1}{3}$ in. long, broadly ovoid, dark-red, becoming almost black when fully ripe, 2-celled. Seeds numerous, in 2 series in each cell, reniform; testa bony.—*Hook. Ic. Plant.* t. 557; *Bot. Mag.* t. 4809; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 70; *Handb. N.Z. Fl.* 74; *Kirk, Forest Fl.* t. 131; *Students' Fl.* 164.

NORTH ISLAND: Common in woods from the North Cape to Cook Strait. SOUTH ISLAND: Various localities in Marlborough and Nelson, rare. Ascends to 2000 ft. *Ramarama*. December–January.

Easily distinguished by the tumid or blistered surface of the leaves, and by the calyx and petals being covered with minute warts. The peduncles are sometimes 2-flowered.

2. *M. Ralphii*, Hook. f. *Fl. Nov. Zel.* ii. 329.—An erect branching shrub 6–15 ft. high, rarely taller and becoming a small tree; branchlets very slender, and with the young leaves sparingly tomentose. Leaves $\frac{2}{3}$ –1 in. long, usually green, shortly petioled, ovate or oblong-ovate to orbicular-ovate, obtuse or acute, thinly coriaceous or almost membranous, the surface flat or very slightly tumid between the veins. Flowers quite as in *M. bullata* but slightly smaller. Berry $\frac{1}{4}$ – $\frac{1}{3}$ in. long, broadly ovoid, dark-red, 2-celled. Seeds much fewer than in *M. bullata*.—*Handb. N.Z. Fl.* 74; *Kirk, Forest Fl.* t. 94; *Students' Fl.* 165.

NORTH ISLAND: From Whangarei to Cook Strait, but often local. SOUTH ISLAND: Nelson and Marlborough, rare. Sea-level to 1500 ft. December–January.

Very closely allied to *M. bullata*, but the leaves are smaller, usually green, with the surface plane or very slightly tumid; and the berry has fewer seeds

3. *M. obcordata*, Hook. f. *Fl. Nov. Zel.* i. 71.—A much-branched shrub 5–15 ft. high; branches slender, spreading, the younger ones pubescent. Leaves opposite or in opposite fascicles, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, obcordate, narrowed into a short puberulous petiole, coriaceous, glabrous on both surfaces or slightly silky when young. Flowers solitary, axillary, $\frac{1}{4}$ in. diam., white. Peduncles as long as the leaves, pubescent. Calyx 4-lobed; lobes oblong, acute. Petals 4, orbicular. Berry $\frac{1}{4}$ in. long, broadly ovoid, dark-red or violet, 2-celled. Seeds 1–2 in each cell, reniform; testa bony.—*Handb. N.Z. Fl.* 74; *Kirk, Forest Fl.* t. 70; *Students' Fl.* 165. *Eugenia obcordata*, *Raoul in Ann. Sci. Nat. Ser. iii.* 2 (1844) 122.

NORTH AND SOUTH ISLANDS: In woods from Whangarei to Foveaux Strait, but local north of the East Cape. Sea-level to 2000 ft. *Rohutu*. December–January.

4. *M. pedunculata*, Hook. f. in Hook. *Ic. Plant.* t. 629. — A much-branched compact or diffuse shrub 5–15 ft. high; branches slender, glabrous, 4-angled. Leaves opposite, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, obovate or obovate-oblong or oblong-ovate, rounded at the tip, rarely acute, coriaceous, glabrous, narrowed into short petioles. Flowers axillary, solitary, $\frac{1}{4}$ in. diam., white. Peduncles slender, glabrous, longer or shorter than the leaves. Calyx glabrous, 5-lobed, 2-bracteolate at the base. Petals 5, rounded. Berry small, $\frac{1}{4}$ in. long, broadly ovoid, red or yellowish, 2-celled. Seeds 2–5.—*Fl. Nov. Zel.* i. 71; *Handb. N.Z. Fl.* 74; *Kirk, Forest Fl.* t. 112; *Students' Fl.* 165. *Eugenia vitis-idæa*, *Raoul in Ann. Sci. Nat. Ser. iii.* 2 (1844) 122.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Hokianga and the Bay of Islands southwards, but often local. Sea-level to 2000 ft. *Rohutu*. December–January.

Closely allied to *M. obcordata*, but easily recognised by the glabrous branchlets, obovate leaves rounded at the tip, and 5-lobed calyx.

4. **EUGENIA**, Linn.

Shrubs or trees, glabrous or rarely tomentose or villous. Leaves opposite, penniveined. Flowers solitary and axillary, or in terminal or lateral cymes or panicles. Calyx-tube globose to narrow-turbinate; lobes 4, rarely 5. Petals the same number as the calyx-lobes. Stamens numerous, in many series. Ovary 2- or rarely 3-celled; style filiform; stigma small; ovules numerous in each cell. Fruit a berry, rarely dry and fibrous, crowned by the persistent calyx-limb. Seeds solitary or few, globose or variously compressed; testa membranous or cartilaginous. Embryo thick and fleshy; radicle short; cotyledons thick, more or less united or distinct.

An immense genus of more than 700 species, spread over the tropical and subtropical regions of both hemispheres. There is little to separate it from *Myrtus* except the thick and fleshy embryo with a short radicle. The single New Zealand species is endemic.

1. **E. maire**, *A. Cunn. Precur.* n. 564.—A small tree 20-50 ft. high, perfectly glabrous in all its parts; trunk 1-2 ft. diam., with white bark; branchlets slender, 4-angled. Leaves opposite, 1-2 in. long, oblong-lanceolate or elliptic-lanceolate to elliptic-oblong, acute or acuminate, rather membranous, narrowed into short slender petioles. Flowers $\frac{1}{2}$ in. diam., sometimes almost unisexual, white, in terminal many-flowered corymbose panicles $1\frac{1}{2}$ -3 in. broad; pedicels slender, glabrous. Calyx-tube broadly obconic; lobes very short, broad, deciduous. Petals orbicular, falling away early. Stamens slender, $\frac{1}{2}$ - $\frac{2}{3}$ in. long. Ovary wholly adnate to the base of the calyx-tube, 2-celled; ovules numerous. Berry $\frac{1}{2}$ in. long, ovoid, red, crowned by the persistent calyx-limb, 1-celled. Seed solitary, large; testa hard, coriaceous.—*Rioul, Choix.* 49; *Hook. f. Fl. Nov. Zel.* i. 71; *Handb. N.Z. Fl.* 74; *Kirk, Forest Fl.* t. 122; *Students' Fl.* 165.

NORTH ISLAND: Swampy forests from the North Cape southwards, abundant. SOUTH ISLAND: Queen Charlotte Sound and Pelorus Valley, *J. Rutland*. Sea-level to 1500 ft. *Maire-tawake*. March-May.

Wood hard, dense, and durable; valuable for cabinet-work, turnery, &c.

ORDER XXIX. **ONAGRARIÆ.**

Herbs, rarely shrubs or small trees. Leaves opposite or alternate, simple, entire or toothed, exstipulate. Flowers usually regular, hermaphrodite. Calyx-tube often elongated, altogether adnate to the ovary, sometimes produced beyond it; limb of 2-5 valvate lobes. Petals as many as the calyx-lobes, inserted at the top of the calyx-tube, rarely wanting. Stamens as many or twice as many as the petals, inserted with them. Ovary inferior, usually 2-4-celled; style simple, filiform; stigma capitate or 2-4-lobed; ovules usually numerous in each cell, in 1 or 2 series, pendulous or

ascending; placentas axile. Fruit various, generally a 2-4-celled capsule with loculicidal or septicidal dehiscence, sometimes a berry, rarely nut-like. Seeds usually small, sometimes provided with a tuft of hairs; albumen none, or a thin layer only.

A small order of about 11 genera and 300 species, widely spread in temperate regions, rare in the tropics; most plentiful in North America, especially in Mexico. Many of the species have handsome flowers, and are frequently cultivated in gardens, particularly the genera *Godetia*, *Oenothera*, *Clarkia*, and *Fuchsia*, but they have no other economical importance. Of the New Zealand genera, *Epilobium* is universal in cool climates; *Fuchsia* is confined to South America with the exception of the New Zealand species.

Herbs. Fruit an elongated capsule. Seeds with a tuft of

hairs	..	..	..	..	1. EPILOBIUM.
Shrubs or small trees.	Fruit a berry	..	..	..	2. FUCHSIA.

1. EPILOBIUM, Linn.

Herbs; stems erect or decumbent or creeping, sometimes hard and almost woody at the base. Leaves alternate or opposite, entire or toothed. Flowers rose-coloured or purple or white, solitary in the upper axils or forming a terminal raceme or spike. Calyx-tube scarcely produced beyond the ovary, linear, 4-angled or nearly terete; limb 4-partite, deciduous. Petals 4, obovate or obcordate, spreading or erect. Stamens 8, the 4 alternate ones shorter. Ovary inferior, 4-celled; style filiform; stigma clavate or with 4 spreading or erect lobes; ovules numerous, 2-seriate, ascending. Capsule elongate, 4-angled, 4-celled and 4-valved, the valves separating and curving back from a central seed-bearing axis. Seeds numerous, broadest above, the summit furnished with a tuft of long hairs.

A large genus in the temperate and cold regions of both hemispheres; rare in the tropics, except on high mountains; more abundant in New Zealand than in any other part of the world. Species variously estimated by authors, from 60 to nearly 200.

The species of *Epilobium* are well known to be highly variable in any country that they inhabit, but in New Zealand the amount of variation is inordinately great, making it difficult to affix limits to many of the species, which appear to merge gradually into one another. In the arrangement of the New Zealand forms I have for the most part followed Professor Haussknecht's elaborate and beautifully illustrated monograph, but I have been unable to accept the whole of the species he has proposed, several of them appearing to me to rest on characters much too trivial or inconstant. The beginner will find it most difficult to identify any of the species with certainty, and his only safe course is to collect copious suites of specimens and to defer all attempts to name them until he has gained a clear idea of the prevalent forms and their characters.

A. Similes. Stems tall, erect, herbaceous, slightly woody at the base. Flowers numerous, towards the ends of the branches.

* Leaves sessile or nearly so.

Tall, often 3 ft. high. Leaves lanceolate or linear-lanceolate. Flowers numerous, large, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., white	..	1. <i>E. pallidiflorum</i> .
Slender, 1-2 ft. Leaves distant, ovate-oblong. Flowers few, large, $\frac{1}{3}$ - $\frac{1}{2}$ in., white	.. ..	2. <i>E. chionanthum</i> .

Stout, $\frac{3}{4}$ -2 ft. Leaves close-set, ovate or ovate-oblong.

Flowers small, $\frac{1}{8}$ - $\frac{1}{2}$ in. diam., red 3. *E. Billardieri-anum*.
Slender, $\frac{1}{2}$ -3 ft. Leaves lanceolate or linear-lanceolate.
Flowers small, $\frac{1}{8}$ - $\frac{1}{2}$ in. diam., purplish 4. *E. junceum*.

** Leaves distinctly petiolate.

Slender, $\frac{1}{2}$ -2 ft. Leaves ovate or ovate-oblong, membranous. Flowers $\frac{1}{8}$ - $\frac{1}{2}$ in., white or pink 5. *E. pubens*.

B. Microphyllæ. Stems small, slender, herbaceous, creeping below, erect or ascending towards the tips. Flowers few, towards the ends of the branches.

* Fruiting peduncles short, seldom exceeding the leaves.

Stems 2-6 in., prostrate, matted. Leaves close-set, oblong, $\frac{1}{4}$ - $\frac{1}{2}$ in. Capsule glabrous 6. *E. confertifolium*.

Stems 3-10 in., ascending. Leaves linear-oblong, coarsely toothed, blotched, $\frac{1}{2}$ - $\frac{3}{4}$ in. Capsule evenly hoary-pubescent 7. *E. pictum*.

** Fruiting peduncles elongated.

† Leaves comparatively narrow, linear or linear-oblong to oblong.

Stems 1-4 in. Leaves linear or linear-oblong, $\frac{1}{8}$ - $\frac{1}{2}$ in. Capsule slender. Peduncles much elongated 8. *E. tenuipes*.

Stems 2-6 in. Leaves linear-oblong to oblong, $\frac{1}{4}$ - $\frac{1}{2}$ in. Capsule pubescent on the angles 9. *E. Hectori*.

†† Leaves broad, oblong to ovate or orbicular.

Stems 2-10 in., slender, pubescent. Leaves small, $\frac{1}{8}$ - $\frac{1}{2}$ in., broadly oblong to orbicular. Capsule evenly pubescent 10. *E. alsinoides*.

Stems 6-18 in., slender, firm. Leaves ovate - cordate. Flowers large, $\frac{1}{2}$ in. diam. Capsule 1-2 in. 11. *E. chloræfolium*.

Stems 6-18 in., weak and flaccid. Leaves distant, ovate, entire or obscurely toothed, almost sessile, membranous 12. *E. insulare*.

Stems 6-18 in., weak. Leaves distant, orbicular, sharply toothed, petiolate, membranous 13. *E. rotundifolium*.

C. Sparsifloræ. Stems small, slender, prostrate and creeping, herbaceous. Flowers few, in the axils of the intermediate leaves. Capsules long-stalked.

Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in., orbicular, sharply toothed, membranous .. 14. *E. linnæoides*.

Leaves $\frac{1}{8}$ - $\frac{1}{2}$ in., suborbicular, entire or obscurely sinuate, subcoriaceous 15. *E. nummularifolium*.

Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in., orbicular-oblong, thick and coriaceous, purplish below 16. *E. purpuratum*.

Leaves $\frac{1}{4}$ - $\frac{3}{4}$ in., ovate, obscurely toothed. Flowers large, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. 17. *E. macropus*.

D. Dermatophyllæ. Suffruticulose, usually small, stems hard and woody at the base. Leaves more or less rigid and coriaceous. Flowers few, terminal or nearly so.

* Fruiting peduncles elongated.

Much branched, slender, wiry, bifariously pubescent, 3-6 in. high. Leaves ovate, petiolate, $\frac{1}{4}$ - $\frac{3}{8}$ in. .. 18. *E. gracilipes*.

Stout, fleshy, prostrate, glabrous, 2-6 in. long. Leaves large, obovate-spathulate, entire, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. .. 19. *E. crassum*.

** Fruiting peduncles short.

Stems prostrate or straggling, glabrous, woody at the base, 6-15 in. Leaves elliptic, coriaceous and shining, reddish, acute, petioled, $\frac{3}{4}$ -1 in. Flowers $\frac{1}{4}$ - $\frac{1}{2}$ in. .. 20. *E. brevipes*.

- Stems decumbent, bifariously pubescent, 4-8 in. Leaves oblong or oblong-ovate, obtuse, coriaceous, glossy, $\frac{1}{4}$ - $\frac{3}{4}$ in. Flowers very large, $\frac{1}{2}$ - $\frac{3}{4}$ in. .. 21. *E. vernicosum*.
- Stems numerous, decumbent, 2-8 in. Leaves densely crowded, linear-oblong, coarsely denticulate, $\frac{1}{2}$ - $\frac{3}{4}$ in. Flowers sessile, large, white, crowded, $\frac{1}{2}$ in. Capsules almost hidden by the leaves .. 22. *E. pycnostachyum*.
- Stems numerous, rigid, erect, black. Leaves crowded, linear-oblong, deeply toothed or almost lobed, $\frac{1}{4}$ - $\frac{3}{4}$ in. Flowers small, $\frac{1}{2}$ in. Capsules glabrous .. 23. *E. melanocaulon*.
- Stems numerous, erect, 2-6 in., grey with fine pubescence. Leaves crowded, linear-oblong, coarsely toothed. Capsules suddenly narrowed below the tip, finely pubescent .. 24. *E. rostratum*.
- Stems numerous, rigid and wiry, purplish-black, 3-8 in. Leaves small, uniform, ovate-obicular, entire, $\frac{1}{8}$ - $\frac{1}{2}$ in. Capsules silvery-pubescent on the angles .. 25. *E. microphyllum*.
- Stems numerous, short, 2-6 in. Leaves oblong-ovate, entire, $\frac{1}{2}$ - $\frac{1}{2}$ in. Flowers small, $\frac{1}{2}$ in. Capsule glabrous .. 26. *E. Krulleianum*.
- Stems numerous, erect, 6-14 in. Leaves oblong or linear-oblong, obtuse, often reddish, sinuate-denticulate, $\frac{1}{2}$ - $\frac{3}{4}$ in. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. Capsules on short peduncles .. 27. *E. glabellum*.
- Stems branched, erect, 3-9 in. Leaves narrower than in *E. glabellum*, pale-green. Flowers $\frac{1}{2}$ in. Capsules on peduncles that slightly elongate .. 28. *E. novæ-zealandiæ*.

1. *E. pallidiflorum*, Sol. ex A. Cunn. *Precur.* n. 550.—Stems leafy, terete, 1-3 ft. high, decumbent and rooting at the base and emitting numerous stolons, erect above, simple or branched, glabrous below, finely puberulous above. Leaves 1-4 in. long, opposite or the uppermost alternate, often semiamplexicaul, sessile or nearly so, lanceolate or linear-lanceolate or linear-oblong, gradually tapering to an acute point, irregularly denticulate or almost entire, glabrous or the margins puberulous. Flowers usually numerous towards the ends of the branches, large, handsome, $\frac{3}{4}$ in. diam., white or pale-rose. Calyx-lobes half as long as the corolla, lanceolate, acute. Petals obcordate. Stigma oblong-clavate. Capsules 2-4 in. long, finely and densely hoary-pubescent; peduncles shorter than the leaves. Seeds minutely papillose.—*Hook. f. Fl. Nov. Zel.* i. 61; *Handb. N.Z. Fl.* 81; *Benth. Fl. Austral.* iii. 305; *Haussk. Monog. Epilob.* 292; *Kirk, Students' Fl.* 169. *E. macranthum*, *Hook. Ic. Plant.* t. 297.

NORTH AND SOUTH ISLANDS, CHATHAM ISLAND: Abundant in marshes from the North Cape to Foveaux Strait. Sea-level to 1500 ft. November-February. Also in Australia and Tasmania.

A very distinct species, readily known by the large size, long acute leaves, and large white flowers.

2. *E. chionanthum*, *Haussk. in Oestr. Bot. Zeitschr.* xxix. (1879) 149.—Stems slender, 1-2 ft. high, decumbent and stoloniferous at the base, ascending above, simple or rarely branched, terete, glabrous below, usually thinly puberulous above. Leaves all opposite except the floral ones, distant, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. long, sessile or nearly so, ovate-oblong or oblong-lanceolate, obtuse or subacute,

pale-green, minutely denticulate, glabrous. Flowers in the axils of the upper leaves, few (1-6) large, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., white. Calyx-segments lanceolate, acute, puberulous. Petals obcordate, much longer than the calyx. Stigma capitate. Capsule 2-3 in. long, rather stout, puberulous; pedicels about twice as long as the leaves. Seeds smooth.—*Monog. Epitob.* 287, t. 22, f. 92 a, b; *Kirk, Students' Fl.* 168.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in swampy places from the North Cape to Foveaux Strait. Sea-level to 1500 ft. November-February.

A well-marked plant, easily recognised by the slender usually simple stems, distant pale-green and glabrous leaves, large white flowers, and smooth seeds.

3. *E. Billardierianum*, *Ser. in D.C. Prodr.* iii. 41.—Stems stout, leafy, $\frac{3}{4}$ -2 ft. high, decumbent and woody at the base and giving off numerous stolons, strict and erect above, simple or branched, dull-green or reddish, usually with hoary-pubescent lines decurrent from the leaves. Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in. long, variable in shape, ovate or ovate-oblong to linear-oblong, obtuse or rarely subacute, sessile, lower opposite and often connate at the base, upper sometimes alternate, glabrous, finely and closely denticulate. Flowers numerous, small, $\frac{1}{6}$ - $\frac{1}{5}$ in. diam., pink, crowded in the upper axils. Calyx-lobes ovate-lanceolate, nearly equalling the petals. Stigma rounded-clavate. Capsules 1-2 $\frac{1}{2}$ in. long, finely and evenly hoary-pubescent; peduncles shorter or slightly longer than the leaves. Seeds minutely papillose.—*Hausk. Monog. Epilob.* 293; *Kirk, Students' Fl.* 170. *E. tetragonum*, *Hook. f. Fl. Nov. Zel.* i. 60; *Handb. N.Z. Fl.* 80; *Benth. Fl. Austral.* iii. 305, *not of Linn.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 2000 ft. November-February. Also in Australia and Tasmania.

The distinctive characters of this species are the robust habit, usually reddish stems, broad obtuse leaves, and numerous small pinkish flowers; but some varieties approach *E. junceum* very closely. Professor Haussknecht distinguishes two forms: *a*, *simplex*, with an unbranched few-flowered stem and small rather remote oblong leaves narrowed at the base; and *b*, *major*, which has the stem stouter and branched, and the leaves larger, broader, and cordate at the base.

4. *E. junceum*, *Sol. ex Forst. Prodr.* n. 516.—Stems erect or ascending from a woody decumbent base, $\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high, leafy, terete, stout or slender, simple or branched, hoary-pubescent or tomentose or nearly glabrous. Leaves opposite or alternate, sessile, often crowded, very variable in size, $\frac{1}{2}$ -3 in. long, oblong-lanceolate or linear-lanceolate, narrowed at the base, truncate or mucronate or acute at the apex, denticulate or sinuate-toothed, hoary-pubescent or tomentose or almost villous, sometimes glabrescent. Flowers usually numerous towards the ends of the branches, small, purplish, $\frac{1}{6}$ - $\frac{1}{5}$ in. diam.; peduncles longer or shorter than the leaves. Calyx-lobes lanceolate, acute. Stigma

clavate. Capsule $1\frac{1}{2}$ –3 in. long, glabrate or hoary-pubescent or tomentose; peduncles longer or shorter than the leaves. Seeds minutely papillose.—*A. Cunn. Precur.* n. 551; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 60; *Handb. N.Z. Fl.* 80; *Benth. Fl. Austral.* iii. 304; *Haussk. Monog. Epilob.* 289; *Kirk, Students' Fl.* 169.

An exceedingly variable plant, the numerous forms of which may be grouped in the three following varieties:—

Var. **cinereum**, *Haussk. l.c.* 290.—Stems slender, often much branched, usually more or less covered with fine appressed greyish-white pubescence, rarely glabrate. Leaves small, often crowded, $\frac{1}{2}$ –1 in. long, linear-lanceolate, entire or sparingly denticulate, acute or mucronate, finely ashy-pubescent or glabrate. Flowers small. Capsules $1\frac{1}{2}$ –2 in. long, slender, hoary-pubescent.—*E. cinereum*, *A. Rich. Fl. Nouv. Zel.* 330; *A. Cunn. Precur.* n. 544. *E. incanum*, *virgatum*, and *confertum*, *A. Cunn. l.c.* nn. 545, 547, 549.

Var. **hirtigerum**, *Hook. f. Fl. Nov. Zel.* i. 60.—Stems tall, strict, erect, simple or sparingly branched, usually villous with soft spreading hairs mixed with shorter ones. Leaves 1 – $2\frac{1}{2}$ in. long, lanceolate, acute or obtuse, coarsely and irregularly denticulate, both surfaces clothed with soft spreading hairs. Capsules 2–3 in. long, hoary-pubescent or villous.—*E. hirtigerum*, *A. Cunn. l.c.* n. 546; *Haussk. l.c.* 291.

Var. **macrophyllum**, *Haussk. l.c.* 290.—Stems tall, often 3 ft. high, strict, erect, simple or sparingly branched, glabrous and often reddish below, finely and sparsely pubescent above. Leaves large, 1–3 in. long, lanceolate, acute or acuminate, rather thin and membranous, sinuate-denticulate, glabrous or the upper ones thinly puberulous. Capsules 2–3 in. long, hoary-pubescent.—*E. erectum*, *Petrie in Trans. N.Z. Inst.* xxxiv. (1902) 390.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape to Foveaux Strait, ascending to 3500 ft. October–February. A common Australian plant.

The extreme states of the above varieties have a very distinct appearance, and might have been treated as species were they not connected by numerous intermediate forms, which make it quite impossible to draw strict lines of demarcation between them.

5. **E. pubens**, *A. Rich. Fl. Nouv. Zel.* 329, t. 36.—Stems $\frac{1}{2}$ –2 ft. high, slender, simple or branched, decumbent and woody at the base, erect above, terete, uniformly clothed with a short fine pubescence. Leaves all alternate or the very lowest alone opposite, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, ovate or ovate-oblong, obtuse or rarely subacute, narrowed into slender petioles, pubescent on both surfaces, membranous, toothed or repand-denticulate. Flowers in the axils of the upper leaves, numerous, small, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., white or pink. Calyx-lobes lanceolate, acute, puberulous. Stigma clavate. Capsules 1–2 in. long, hoary-pubescent; peduncles shorter than the leaves. Seeds minutely papillose.—*A. Cunn. Precur.* n. 543; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 61; *Handb. N.Z. Fl.* 80; *Haussk. Monog. Epilob.* 295; *Kirk, Students' Fl.* 170.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant from the North Cape southwards. Sea-level to nearly 4000 ft. October–January. Also in Australia, according to Professor Haussknecht.

6. **E. confertifolium**, *Hook. f. Ic. Plant.* t. 685.—Primary stems 2–6 in. long, creeping and rooting at the nodes, often forming

broad matted patches; branches rooting at the base, ascending at the tips, terete or obscurely tetragonous, usually bifariously pubescent but sometimes obscurely so. Leaves opposite, usually close-set, often imbricating, shortly petioled, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong or oblong-obovate or ovate, obtuse, fleshy, glabrous, entire or remotely obscurely denticulate; petioles broad, almost sheathing, connate at the base. Flowers few towards the ends of the branches, almost sessile, small, $\frac{1}{5}$ in. diam. Calyx-lobes lanceolate, acute. Petals 2-lobed to the middle. Stigma clavate. Capsules $\frac{1}{3}$ – $\frac{3}{4}$ in. long, strict, perfectly glabrous; peduncles shorter or slightly longer than the leaves. Seeds minutely papillose.—*Fl. Antarct.* i. 10; *Handb. N.Z. Fl.* 78; *Haussk. Monog. Epilob.* 295; *Kirk, Students' Fl.* 171.

Var. **tasmanicum**.—Pale-green, much more slender. Leaves ovate or ovate-oblong, on longer petioles, usually more distinctly denticulate.—*E. tasmanicum*, *Haussk. l.c.* 296, t. 20, f. 84; *Kirk, Students' Fl.* 171.

SOUTH ISLAND: Both varieties not uncommon in mountain districts, altitude 1500–5500 ft. AUCKLAND AND CAMPBELL ISLANDS: The typical form only, *Hooker, Filhol! Kirk! Chapman!* ANTIPODES ISLAND: *Kirk!*

The slender creeping and rooting usually much-branched stems, oblong or obovate leaves narrowed into short petioles, the few small flowers, and the glabrous short-stalked capsules are the best marks of this species. Reduced forms of *E. glabellum* and its allies approach it very closely, but are much less prostrate and more hard and woody at the base. Professor Haussknecht's *E. tasmanicum* appears to me to be barely separable even as a variety.

7. ***E. pictum***, *Petrie in Trans. N.Z. Inst.* xxviii. (1896) 538. —Stems few, slender, 8–10 in. high, decumbent and sparingly branched below, ascending or erect above, terete, finely and evenly pubescent, especially towards the tips of the branches. Lower leaves opposite, upper alternate, spreading, remote, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, linear-oblong to oblong or ovate-oblong, obtuse, sessile or shortly petioled, membranous, often blotched with grey, usually sharply and coarsely remotely denticulate. Flowers 2–6 towards the tips of the branches, small, pink, $\frac{1}{5}$ in. diam. Calyx-lobes ovate-lanceolate, almost equalling the petals. Stigma narrow-clavate. Capsules 1– $1\frac{1}{2}$ in. long, slender, densely and evenly hoary-pubescent; peduncles short, never exceeding the leaves. Seeds smooth.—*E. haloragifolium*, *Kirk, Students' Fl.* 177 (not of *A. Cunn.*).

SOUTH ISLAND: Canterbury—Upper Waimakiriri, *Kirk! T. F. C.*; Craigieburn Mountains, *Cockayne!* Mount Cook District, *T. F. C.* Otago—Not uncommon in the mountain-valleys of the interior, *Petrie!* 1000–3000 ft. December–February.

Professor Haussknecht has suggested that this may be identical with Cunningham's *E. haloragifolium* (*Precur.* n. 552), an obscure plant gathered near the Waikare River, Bay of Islands, and this view has been adopted by Kirk in the “*Students' Flora*.” But Cunningham's original description is so short and incomplete that it might stand for several species, and *E. pictum* has not yet been found in any locality in the North Island. Hooker referred *E. haloragifolium* to *E. alsinoides*, a plant not uncommon at the Bay of Islands, and it appears to me that this reduction is much more likely to prove correct.

8. **E. tenuipes**, Hook. f. *Fl. Nov. Zel.* i. 59.—Stems short, slender, 1–4 in. long, decumbent and rooting at the base, ascending at the tips, bifariously pubescent. Leaves opposite or alternate, crowded, rigid, erecto-patent, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, narrow linear-oblong, lower ones obtuse, upper acute, narrowed at the base, glabrous, remotely denticulate or almost entire. Flowers few, solitary in the axils of the upper leaves or terminal, small, white, $\frac{1}{8}$ in. diam. Calyx-lobes lanceolate, acuminate. Capsules slender, $\frac{3}{4}$ –1 in. long, glabrous or puberulous; peduncles much elongated, very slender, 2–3 in. long, finely pubescent. Seeds smooth.—*Haussk. Monog. Epilob.* 297, t. 20, f. 83; *Kirk, Students' Fl.* 171. *E. nanum*, Col. in *Trans. N.Z. Inst.* xxvi. (1894) 315.

NORTH ISLAND: Dannevirke (Hawke's Bay) and head of the Wairarapa Valley, *Colenso!* Ruahine Mountains, *A. Hamilton!* SOUTH ISLAND: Not uncommon in mountain districts from Nelson southwards. December–January.

A pretty little plant, easily distinguished by the narrow linear-oblong erect leaves, very long fruiting peduncles, and smooth seeds. Specimens collected by Mr. Petrie on Mount Hikurangi (East Cape district) have much broader ovate-oblong leaves, but the long fruiting peduncles and smooth seeds are those of *E. tenuipes*.

9. **E. Hectori**, *Haussk. Monog. Epilob.* 298, t. 19, f. 82.—Stems slender, branched below, 2–6 in. high, decumbent and rooting at the base and then erect or ascending, pale-green or reddish, terete, uniformly clothed with short crisp hairs or bifariously pubescent. Leaves small, opposite, uppermost alternate, crowded or distant, $\frac{1}{4}$ – $\frac{1}{2}$ long, oblong or linear-oblong, obtuse, entire or remotely denticulate, usually glabrous. Flowers in the axils of the uppermost leaves, small, erect, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., white. Calyx-lobes ovate-lanceolate, acute, shorter than the petals. Stigma clavate. Capsules $\frac{1}{2}$ –1 in. long, purplish-red, obscurely tetraginous, usually pubescent on the angles, rarely glabrous; peduncles much longer than the leaves. Seeds smooth.—*Kirk, Students' Fl.* 172.

NORTH ISLAND: Ruahine Range, *Herb. Colenso!* SOUTH ISLAND: Common in mountain districts from Nelson southwards. Ascends to 3500 ft. December–February.

Often confounded with *E. alsinoides*, from which it is separated by the much more erect habit, narrower leaves, purplish-red capsules with hairy lines, and smooth seeds. The capsule of *E. alsinoides* is always evenly covered with a grey pubescence.

10. **E. alsinoides**, *A. Cunn. Precur.* n. 540.—Stems 4–10 in. long, pale-green, slender, branched, decumbent or creeping and rooting at the base, erect or ascending above, terete, pubescent or more rarely glabrous. Leaves all opposite or the uppermost alone alternate, very shortly petioled, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, orbicular or orbicular-ovate or oblong-ovate, obtuse, rounded at the base, glabrous, entire or remotely denticulate. Flowers few in the upper axils, small, erect, $\frac{1}{5}$ in. diam. Calyx-lobes ovate-lanceolate, acute, almost

equalling the petals. Stigma clavate. Capsules $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, uniformly clothed with pale-grey pubescence; peduncles elongating much as the fruit ripens, 1–2 in. long or more. Seeds papillose.—*Kaoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 59; *Handb. N.Z. Fl.* 79; *Haussk. Monog. Epilob.* 298, t. 23, f. 97. *E. thymifolium*, *R. Cunn. ex A. Cunn. Precur.* n. 539; *Haussk. l.c.* 297.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, ANTIPODES ISLAND: Abundant throughout, ascending to 2500 ft. November–February.

The small size and slender often prostrate habit, uniform roundish pale-green leaves, small flowers collected near the ends of the branches, long peduncles, and evenly pubescent capsules are the best marks of this common plant.

11. *E. chloræfolium*, *Haussk. in Oestr. Bot. Zeitschr.* xxix. (1879) 149.—Stems 6–18 in. high, stout or slender, usually much branched at the base but sometimes almost simple, decumbent or arcuate below, ascending or erect above, terete, glabrous except two pubescent lines decurrent from the margins of the petioles. Leaves opposite, remote, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, broadly ovate to ovate-oblong, obtuse or rarely subacute, rounded or slightly cordate at the base, glabrous or nearly so, remotely denticulate or sinuate-toothed; petioles short, broad, pubescent. Flowers in the axils of the uppermost leaves, rather large, white or rose, $\frac{1}{3}$ in. diam. Calyx-lobes ovate-lanceolate, acute, much shorter than the petals; stigma oblong-capitate. Capsules 1–2 in. long, sparsely pubescent; peduncles longer than the leaves. Seeds papillose.—*Monog. Epilob.* 299, t. 19, f. 81; *Kirk, Students' Fl.* 172. *E. perplexum*, *Kirk, l.c.* 170.

NORTH ISLAND: Mount Hikurangi, East Cape, *Petrie! Lee; Ruahine Range, Colenso, Petrie! Tararua Mountains, T. P. Arnold!* SOUTH ISLAND: Not uncommon in the mountains from Nelson southwards. 2000–4500 ft. December–February.

A well-marked plant, but at the same time a very variable one, especially in height, degree of branching, size of flowers and capsules, &c. Mr. Kirk's *E. perplexum* is merely a luxuriant form, and cannot be separated even as a variety, as the inspection of any large series of specimens will at once show.

12. *E. insulare*, *Haussk. Monog. Epilob.* 300.—Stems 6–18 in. high, slender, weak and flaccid, sparingly branched, creeping and rooting at the base, ascending or suberect towards the tips, often glabrous below, usually thinly pubescent above. Leaves opposite, the upper alternate, distant, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, ovate or oblong-ovate, obtuse or subacute, very shortly petioled, thin and membranous, glabrous or nearly so, entire or obscurely sinuate-toothed. Flowers in the axils of the uppermost leaves, small, erect, white. Calyx-lobes oblong-lanceolate, apiculate, shorter than the petals. Stigma clavate. Capsules 1–2 in. long, slender, pubescent or glabrate. Seeds smooth.—*Kirk, Students' Fl.* 173.

NORTH AND SOUTH ISLANDS: Abundant in lowland swamps from Tauranga and the Thames Valley southwards. CHATHAM ISLANDS: *Cox* and *Cockayne*! November–February.

13. *E. rotundifolium*, *Forst. Prodr.* n. 161. — Stems 5–15 in. long, weak, creeping and rooting at the base, usually erect or ascending above but sometimes altogether prostrate, terete, pubescent or glabrous. Leaves opposite, the uppermost alternate, thin and membranous, distant, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, orbicular or orbicular-ovate, obtuse, rounded at the base, petiolate, closely and sharply unequally toothed, glabrous or slightly puberulous, often reddish beneath. Flowers in the axils of the uppermost leaves, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam., pale-rose or white. Calyx-lobes oblong-lanceolate, acute, shorter than the petals. Stigma narrow-clavate. Capsules about $1\frac{1}{2}$ in. long, glabrous or sparingly pubescent; peduncles much elongated. Seeds papillose.—*A. Rich. Fl. Nouv. Zel.* 326; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 58; *Handb. N.Z. Fl.* 79; *Hauschk. Monog. Epilob.* 299; *Kirk, Students' Fl.* 172.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in moist places from the North Cape southwards. October–February.

Allied to *E. linnæoides*, but at once recognised by the more erect habit, by the uppermost leaves being always alternate, and by the terminal inflorescence. From *E. insulare* it is separated by the larger rounder sharply toothed petiolate leaves and papillose seeds.

14. *E. linnæoides*, *Hook. f. Fl. Antarct.* i. 10, t. 6. — Stems herbaceous, slender, 2–8 in. long, creeping and rooting at the nodes, usually widely and irregularly branched, perfectly glabrous or with 2 faint pubescent lines towards the tips of the branches. Leaves opposite, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., orbicular, petioled, flaccid and membranous, closely and sharply denticulate. Flowers in the axils of leaves remote from the ends of the branches, white or rose, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam. Calyx lobes lanceolate, shorter than the deeply cleft petals. Stigma clavate. Capsules 1–2 in. long, perfectly glabrous; peduncles usually much elongated, 2–4 in. Seeds densely papillose.—*Fl. Nov. Zel.* i. 58; *Handb. N.Z. Fl.* 77; *Hauschk. Monog. Epilob.* 301; *Kirk, Students' Fl.* 173.

NORTH ISLAND: Ruahine Mountains, *Colenso*; Tararua Range, *Buchanan*. SOUTH ISLAND: Not uncommon in damp mountainous places, chiefly on the western side. STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Most abundant, descending to sea-level. ANTIPODES ISLAND: *Kirk*. MACQUARIE ISLAND: *A. Hamilton*. Ascends to 4500 ft. November–February.

Approaches very close to *E. rotundifolium*, but can usually be separated by the smaller size, prostrate habit, leaves all opposite and uniform, and by the flowers being further from the ends of the branches.

15. *E. nummularifolium*, *R. Cunn. ex A. Cunn. Precur.* n. 535. — Stems herbaceous, slender, 2–12 in. long, prostrate and rooting at the nodes, much or sparingly branched, often matted, bifariously pubescent or quite glabrous. Leaves opposite, very variable in size, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, orbicular or orbicular-ovate, rounded

at the apex, shortly petioled or almost sessile, membranous or fleshy or subcoriaceous, entire or sinuate-denticulate; margins flat or slightly recurved. Flowers few, from the axils of leaves remote from the ends of the branches, very small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam. Calyx-lobes ovate-lanceolate, almost equalling the petals. Stigma clavate. Capsules $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, glabrous or pubescent; peduncles much elongated, slender, 2–4 in. long. Seeds papillose.—*Hook. f. Fl. Nov. Zel.* i. 57; *Handb. N.Z. Fl.* 77; *Haussk. Monog. Epilob.* 302; *Kirk, Students' Fl.* 173.

Var. **pedunculare**, *Hook. f. Fl. Nov. Zel.* i. 57.—Stems shorter. Leaves smaller, more closely set, entire or nearly so; petioles shorter. Capsules glabrous; peduncles more slender.—*E. pedunculare*, *A. Cunn. Precur.* n. 536. *E. cæspitosum*, *Haussk. Monog. Epilob.* 301, t. 20, f. 85.

Var. **nerterioides**, *Hook. f. l.c.*—Shorter and usually more densely matted. Leaves smaller, thick and coriaceous; margins recurved. Capsules glabrous.—*E. nerterioides*, *A. Cunn. Precur.* n. 541. *E. pedunculare* var. *aprica*, *Haussk. Monog. Epilob.* 303.

Var. **minimum**, *Kirk, Students' Fl.* 174.—Very small. Stems $\frac{1}{2}$ –1 in. long. Leaves close-set, $\frac{1}{10}$ in. diam., coriaceous; margins revolute. Capsule short and stout, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, exceeding the peduncle.

Var. **angustum**, *Cheesem.*—Stems 2–4 in. long, sparingly branched. Leaves remote, often deflexed, oblong to linear-oblong, entire or nearly so, hardly coriaceous. Capsules rather stout, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, glabrous or with a few scattered hairs; peduncles long. Perhaps a distinct species.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 3000 ft. Var. *nerterioides* also extends to the Auckland Islands and Macquarie Island. Var. *minimum*: Bluff Hill and Puysegur Point, *Kirk*! Var. *angustum*: Cass River, near Lake Tekapo (Canterbury), *T. F. C.*

An excessively variable plant. The varieties described above are simply prevalent forms, and pass into one another by insensible gradations.

16. ***E. purpuratum***, *Hook. f. Handb. N.Z. Fl.* 77. — Stems 1–4 in. long, branched, prostrate and rooting at the nodes, perfectly glabrous, purplish-black. Leaves all opposite, crowded, horizontally spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, broadly oblong or orbicular-oblong, obtuse, shortly petioled, thick and coriaceous, entire or obscurely minutely toothed, purplish below; veins indistinct. Flowers not seen. Peduncles springing from the axils of the intermediate leaves, stout, 2 in. long. Capsules as long as or shorter than the peduncles, stout, purplish-black, perfectly glabrous. Seeds papillose.—*Haussk. Monog. Epilob.* 303; *Barbey, Gen. Epilob.* t. 18, f. 2; *Kirk, Students' Fl.* 174.

SOUTH ISLAND: Alps of Otago, altitude 4000–6000 ft., *Hector and Buchanan*!

Distinguished from all the forms of *E. nummularifolium* by the larger size, stouter habit, and purplish-black colour. I have only seen three indifferent specimens.

17. ***E. macropus***, *Hook. Ic. Plant.* t. 812.—Stems numerous, slender, branched from the base, 3–9 in. long, decumbent or creeping and rooting below, ascending at the tips, purplish, more or less

bifariouly pubescent. Leaves all opposite, somewhat remote, $\frac{1}{4}$ – $\frac{3}{4}$ in long, ovate or ovate-oblong, obtuse or subacute, shortly petioled, obscurely denticulate or almost entire, perfectly glabrous. Flowers few, axillary, near or remote from the ends of the branches, large, white, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Calyx-lobes lanceolate, acute, glabrous, much shorter than the petals. Stigma shortly clavate, emarginate. Capsules 1–2 in. long, erect, glabrous; peduncles elongating much as the fruit ripens, 2–4 in. long. Seeds minutely reticulate.—*Hook. f. Fl. Nov. Zel.* i. 58; *Handb. N.Z. Fl.* 78; *Haussk. Monog. Epilob.* 309, t. 22, f. 93A; *Kirk, Students' Fl.* 179.

NORTH ISLAND: Ruahine Range, *E. W. Andrews!* *Petrie!* Rangipo Plain, *Petrie!* Tararua Mountains and Wainuiomata, *Buchanan!* SOUTH ISLAND: Abundant in mountain districts throughout. Altitudinal range 1500–4500 ft. December–March.

The slender glabrous habit, distant ovate leaves, large flowers, and long fruiting peduncles separate this from all its allies.

18. ***E. gracilipes***, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 351.—Stems numerous from a woody base, 3–6 in. high, decumbent below, erect or ascending above, wiry, reddish, bifariouly pubescent. Leaves opposite or the uppermost alternate, remote, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, ovate, subacute or obtuse, shortly petioled, coriaceous, reddish below, obscurely and remotely denticulate. Flowers 1–3, solitary in the upper axils, small, white, $\frac{1}{5}$ in. diam. Calyx-lobes oblong-lanceolate, acute, shorter than the petals. Stigma obliquely clavate. Capsules $1\frac{1}{2}$ –2 in. long, slender, glabrous; peduncles elongating much as the fruit ripens, often over 2 in. long. Seeds minutely papillose.—*Students' Fl.* 178.

SOUTH ISLAND: Canterbury—Broken River, *J. D. Enys!* *Kirk!* Craigieburn Mountains, *Cockayne!* Bealey, *T. F. C.* Westland—Kelly's Hill, *Cockayne!* 2000–4000 ft. December–February.

A handsome little plant, which approaches *E. macropus* on the one side and *E. nummularifolium* on the other.

19. ***E. crassum***, *Hook. f. Fl. Nov. Zel.* ii. 328.—Stout, fleshy, perfectly glabrous, smooth and polished. Stems woody at the base, prostrate, creeping and rooting at the nodes, 2–6 in. long; branches short, densely leafy, ascending at the tips. Leaves opposite, crowded, thick and fleshy, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, obovate-oblong or obovate-spathulate, obtuse, gradually narrowed into a long and broad sheathing petiole, obscurely and remotely denticulate. Flowers few, in the axils of the upper leaves, rather large, $\frac{1}{3}$ in. diam. or more, white or rose. Calyx-lobes lanceolate, much shorter than the petals. Stigma clavate. Capsules stout, erect, rigid, perfectly glabrous, $1\frac{1}{2}$ –2 in. long; peduncles longer than the leaves when fully mature. Seeds minutely papillose.—*Handb. N.Z. Fl.* 78; *Haussk. Monog. Epilob.* 309, t. 22, f. 93A; *Barbey, Gen. Epilob.* t. 18, f. 1; *Kirk, Students' Fl.* 178.

SOUTH ISLAND: Nelson—Wairau Mountains, *Travers*, *T. F. C.*; Mount Captain, *Kirk*! Mount Percival, *T. F. C.* Marlborough—Upper Awatere, *Monro*, *Sinclair*! Otago—Kurow Mountains, *Buchanan*! *Petrie*! Altitudinal range 3000–6000 ft.

A remarkably distinct species, in its ordinary state quite unlike any other. Its nearest ally is *E. brevipes*, which is a much larger and more erect plant, with shorter elliptic leaves, smaller and more numerous flowers, and much shorter fruiting peduncles.

20. *E. brevipes*, *Hook. f. Fl. Nov. Zel.* ii. 328.—Stout, smooth, glossy, reddish-purple. Stems many from a woody rhizome, 6–15 in. high, prostrate or straggling, branched, ascending above, perfectly glabrous, densely leafy. Leaves all opposite, spreading, $\frac{3}{4}$ –1 in. long, elliptic-oblong or elliptic-lanceolate, acute or subacute, gradually narrowed into a rather long petiole, coriaceous and shining, usually reddish, remotely denticulate. Flowers rather numerous, in the axils of the upper leaves, sessile, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., white or rose. Calyx-lobes lanceolate, acute, almost equalling the petals. Stigma clavate. Capsules $\frac{3}{4}$ – $1\frac{1}{4}$ in. long, slender, glabrous, exceeding the leaves; peduncles very short, hardly elongating in fruit. Seeds minutely reticulate.—*Handb. N.Z. Fl.* 78; *Haussk. Monog. Epilob.* 307, t. 21, f. 89; *Barbey, Gen. Epilob.* t. 19; *Kirk, Students' Fl.* 176.

SOUTH ISLAND: Marlborough—Upper Awatere, *Monro*, *Kirk*! Taylor's Pass, *Spencer*; Mount Fyffe, *Cockayne*! Kaikoura Mountains, *McDonald*. Nelson—Hanmer Plains, *H. J. Matthews*! Gorge of the Conway, *Cockayne*! Canterbury—Mount Torlesse, *Enys* and *Kirk*! *Cockayne*! Altitudinal range 1000–3500 ft. December–February.

21. *E. vernicosum*, *Cheesem. in Trans. N.Z. Inst.* xxviii. (1896) 535.—Stems numerous from a woody rootstock, 4–8 in. high, decumbent or prostrate at the base, erect or ascending above, terete, bifariously pubescent. Leaves usually crowded, opposite or the uppermost alternate, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-oblong to oblong or oblong-ovate, obtuse or subacute, shortly petiolate, coriaceous, very glossy, usually reddish, obscurely and remotely sinuate-denticulate. Flowers 3–5 towards the tips of the branches, almost sessile, very large, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam., pale-rose. Calyx-lobes lanceolate, acute, much shorter than the broad bilobed petals. Stigma shortly and obliquely clavate. Capsules (not quite mature) about 1 in. long, perfectly glabrous; peduncles apparently short. Seeds smooth (?)—*Kirk, Students' Fl.* 176.

SOUTH ISLAND: Nelson—Mount Arthur Plateau and adjacent mountains, altitude 3000–5000 ft., *T. F. C.*, *Gibbs*! Raglan Mountains and Wairau Gorge, *T. F. C.* Otago—Arrowtown, *Petrie*!

The shining leaves and large rose-coloured flowers, which are produced in great abundance, make this a very charming plant. The flowers are larger than those of any other New Zealand species except *E. pallidiflorum*.

22. *E. pycnostachyum*, *Haussk. in Oestr. Bot. Zeitschr.* xxix. (1879) 150.—Stems numerous from the top of a woody prostrate

rhizome, 2-8 in. high, decumbent at the base and then erect or ascending, often reddish, simple or sparingly branched, usually with 2 or 4 pubescent lines. Leaves opposite or the upper ones alternate, densely crowded, ascending, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, narrow-oblong or oblong-obovate, obtuse or acute, narrowed into a short petiole, coarsely and remotely denticulate, glabrous or nearly so; lower ones often much reduced in size. Flowers crowded in the upper axils, hardly projecting beyond the leaves, large, white, $\frac{1}{3}$ in. diam. Calyx-lobes lanceolate, acute, much shorter than the petals. Stigma clavate. Capsules $\frac{1}{2}$ - $\frac{3}{4}$ in. long, sessile or nearly so, stout, glabrous, rarely exceeding the leaves. Seeds papillose. — *Monog. Epilob.* 306, t. 21, f. 88; *Kirk, Students' Fl.* 176.

SOUTH ISLAND: Nelson — Clarence and Waiau Valleys, *Travers!* Mount Captain, *Kirk!* Lake Tennyson, *T. F. C.* Canterbury — Mount Torlesse, *Petrie!* *T. F. C.*; Craigieburn Mountains, *Cockayne!* Arthur's Pass and Upper Waimakariri, *T. F. C.*; Whitcombe's Pass, *Huast!* Otago — Lake District, *Hector* and *Buchanan.* 2000-4500 ft. January-February.

Apparently confined to dry shingle slopes. A well-marked plant, not easily confounded with any other. The large white flowers are almost hidden by the leaves, and the ripe capsules hardly protrude beyond them.

23. **E. melanocaulon**, *Hook. Ic. Plant.* t. 813. — Rootstock stout, hard and woody. Stems numerous, arcuate at the base and then erect, slender, rigid, wiry, simple, black or purplish-black, obscurely tetragonous, glabrous except 2 or 4 faint pubescent lines on the angles. Leaves numerous, usually close-set, opposite or alternate, $\frac{1}{4}$ - $\frac{2}{3}$ in. long, uniform, narrow linear-oblong, obtuse or apiculate, sessile or very shortly petioled, rigid and coriaceous, usually dark-red, glabrous, deeply and coarsely toothed or almost lobed. Flowers sessile in the upper axils, small, erect, $\frac{1}{5}$ in. diam., white or pink. Calyx-lobes ovate-lanceolate, acute, shorter than the petals. Stigma shortly clavate. Capsules $\frac{1}{2}$ -1 in. long, slender, purplish-black, glabrous; peduncles very short. Seeds papillose. *Hook. f. Fl. Nov. Zel.* i. 60; *Handb. N.Z. Fl.* 80; *Hauussk. Monog. Epilob.* 307; *Kirk, Students' Fl.* 177.

Var. **polyclonum**. — Stems much more slender, branched. Leaves distant, spreading, not so deeply toothed. Flowers rather smaller. — *E. polyclonum*, *Hauussk. Monog. Epilob.* 308, t. 20, f. 87A; *Kirk, Students' Fl.* 177.

NORTH ISLAND: Ruahine Range and mountains near Lake Taupo, *Colenso!* SOUTH ISLAND: Abundant throughout in mountain districts. Var. **polyclonum**: Alpine localities in Canterbury and Otago, *Travers!* *Buchanan!* *Petrie!*

The typical form is one of the most easily recognised species of the genus, from the prominent characters of the numerous rigid simple purplish-black stems and small uniform deeply-toothed leaves.

24. **E. rostratum**, *Cheesem. in Trans. N.Z. Inst.* xxviii. (1896) 531. — Stems numerous from a hard woody rootstock, 2-6 in. high, decumbent at the base and then erect, simple or branched, terete, wiry, grey with a short uniform pubescence. Leaves opposite or

the upper alternate, crowded, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, linear-oblong, obtuse or apiculate, coarsely toothed, rigid and coriaceous, glabrous or pubescent near the base, sessile or very shortly petiolate. Flowers rather numerous in the upper axils, small, erect, $\frac{1}{8}$ in. diam. Calyx-lobes ovate-lanceolate, pubescent, almost equalling the petals. Stigma narrow-clavate. Capsules $\frac{1}{2}$ – $\frac{3}{4}$ in. long, sessile or very shortly peduncled, stout, curved, suddenly narrowed below the tip, grooved, finely and closely pubescent. Seeds minutely papillose.—*Kirk, Students' Fl.* 177.

SOUTH ISLAND: Canterbury—Shingly beds of streams, apparently not uncommon. Upper Waimakariri; Lake Tekapo and Lake Pukaki, *T. F. C. Otago*—Naseby, Black's, *Petrie!* 1000–3000 ft. December–February.

This comes nearest to *E. melanocaulon*, from which it is distinguished by its smaller size, paler colour, uniform pubescence, and especially by the short curved capsules, which are abruptly narrowed towards the tip.

25. *E. microphyllum*, *A. Rich. Fl. Nouv. Zel.* 325, t. 36.—Stems very numerous from a hard and woody base, much branched below, 3–8 in. high, shortly decumbent at the base, erect strict and wiry above, dark purplish-black, bifariously pubescent. Leaves small, opposite or the upper ones alternate, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, oblong or ovate-oblong or ovate-orbicular, obtuse, sessile or very shortly petioled, obscurely denticulate or quite entire, glabrous, coriaceous. Flowers few towards the tips of the branches, small, white or pink, $\frac{1}{8}$ in. diam. Calyx-lobes ovate-lanceolate, acute, almost equalling the petals. Stigma clavate. Capsules $\frac{1}{2}$ – $\frac{3}{4}$ in. long, strict, erect, purplish-black with 4 silvery pubescent lines on the angles; peduncles very short, hardly exceeding the leaves. Seeds smooth.—*A. Cunn. Precur.* n. 537; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 59; *Handb. N.Z. Fl.* 79; *Haussk. Monog. Epilob.* 308, t. 18, f. 79; *Kirk, Students' Fl.* 178.

NORTH ISLAND: East Coast and Cape Palliser, *Colenso!* near Waiapu, *Petrie!* Lake Waikaremoana, *Elsdon Best!* Tukituki River, *Petrie!* Orongorongo River, *Kirk.* SOUTH ISLAND: Abundant in shingly river-beds in mountain districts. Sea-level to 3000 ft. *Papa-koura.* December–February.

A well-known plant, easily recognised by the strict and wiry habit, purplish-black stems, small uniform leaves, small flowers, and dark-purplish capsules with silvery-pubescent angles.

26. *E. Krulleanum*, *Haussk. Monog. Epilob.* 305, t. 23, f. 95.—Stems numerous from a hard and woody base, 2–6 in. high, decumbent below, erect above, strict and wiry, densely leafy, bifariously pubescent. Leaves opposite or the uppermost alternate, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, ovate or oblong-ovate, obtuse, shortly petioled, coriaceous, often purplish, entire or very obscurely denticulate. Flowers few in the upper axils, small, erect, $\frac{1}{8}$ in. diam. Calyx-lobes ovate-lanceolate, acute, almost equalling the petals. Stigma clavate. Capsule strict, erect, glabrous, $\frac{3}{4}$ – $1\frac{1}{4}$ in. long; peduncles usually shorter than the leaves. Seeds papillose.—*Kirk, Students' Fl.* 175.

SOUTH ISLAND: Nelson—Hanmer Plains, *Kirk!* Canterbury—*Krull, Haast.* Otago—Mount Earnslaw and the Humboldt Mountains, *Cockayne!* 1500–3500 ft. December–February.

A very imperfectly understood species, of which much more complete specimens are required before its exact position can be determined.

27. *E. glabellum*, *Forst. Prodr. n.* 160.—Stems 6–14 in. high, usually numerous from a hard and woody base, decumbent below, strict and erect above, terete or obscurely tetragonous, often red or purple, glabrous with the exception of 2 or 4 pubescent lines decurrent from the petioles, simple or branched below, remotely or densely leafy. Leaves opposite or the upper alternate, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, ovate or ovate-oblong to narrow-oblong, obtuse, shortly petioled or almost sessile, perfectly glabrous, usually red or purple, often shining, from almost membranous to coriaceous, remotely sinuate-denticulate. Flowers in the upper axils, few or many, erect, white or pink, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam. Calyx-lobes ovate-lanceolate, acute, glabrous, shorter than the petals. Stigma rounded-clavate. Capsules 1–2 in. long, slender, erect, glabrous; peduncles short, seldom much exceeding the leaves. Seeds papillose.—*Hook. f. Fl. Nov. Zel. i.* 59; *Handb. N.Z. Fl.* 79; *Haussk. Monog. Epilob.* 304; *Kirk, Students' Fl.* 174. *E. erubescens*, *Haussk. l.c.* 306, t. 23, f. 98; *Kirk, l.c.* 175.

NORTH ISLAND: Rare and local north of the East Cape, common in mountain districts from thence southwards. SOUTH ISLAND: Abundant throughout. Sea-level to over 5000 ft. December–February.

One of the most variable and puzzling plants in New Zealand; excessively plentiful in hilly and mountainous districts in the South Island. I have reunited Professor Haussknecht's *E. erubescens* with it, finding it quite impossible to lay down a strict line of demarcation between the two plants. The true *E. glabellum* is less rigid, with more membranous distantly placed leaves, and the capsules are longer and shortly stalked. *E. erubescens* has numerous rigid simple stems, the leaves are crowded and erect, the flowers more numerous, and the capsules shorter and almost sessile. But intermediate states are plentiful, and many of them might with equal propriety be placed under either head.

28. *E. novæ-zeelandiæ*, *Haussk. Monog. Epilob.* 305, t. 20, f. 86.—Stems 3–9 in. high, decumbent or prostrate at the base, erect or ascending above, branched, usually pale-green, bifariously pubescent. Leaves opposite or the uppermost alternate, $\frac{1}{2}$ –1 in. long, lanceolate or linear-oblong to oblong, obtuse or subacute, sessile or very shortly petiolate, rather thin, light-green, glabrous, obscurely and remotely denticulate. Flowers in the axils of the upper leaves, small, white, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam. Calyx-lobes ovate-lanceolate, glabrous, shorter than the petals. Stigma shortly clavate. Capsules $\frac{3}{4}$ –1½ in. long, slender, glabrous; peduncles usually longer than the leaves when the fruit is mature. Seeds papillose.—*Kirk, Students' Fl.* 175. *E. elegans*, *Petrie in Trans. N.Z. Inst.* xxix. (1897) 425.

NORTH ISLAND: Bay of Islands, *Colenso!* n. 103, *Wilkes* (Haussknecht). SOUTH ISLAND: Apparently not uncommon throughout.

This requires further investigation with more complete material. Some of the forms included in it by Haussknecht hardly differ from *E. glabellum*, except in the more branching habit, paler colour, and longer-stalked capsules, and would probably be better placed under that species. Others (*E. elegans*, Petrie) have the stems simple or branched at the base alone, with much narrower leaves, larger flowers, and the peduncles elongate considerably in fruit.

2. FUCHSIA, Linn.

Shrubs or small trees. Leaves alternate or opposite or whorled. Flowers axillary, solitary or clustered, rarely in racemes or panicles, usually pendulous, often handsome. Calyx-tube ovoid, produced above the ovary into a tubular or campanulate 4-lobed limb. Petals 4, often small, rarely wanting, convolute, spreading or reflexed. Stamens 8; filaments filiform; anthers linear or oblong. Ovary 4-celled; style slender, elongated; stigma capitate, entire or 4-lobed; ovules numerous, attached to the inner angle of the cells. Berry ovoid or oblong, fleshy, 4-celled, many-seeded.

A beautiful and well-known genus of about 60 species, all of which, with the exception of the three following, are natives of America, from Mexico to Fuegia.

* Flowers pendulous. Petals present, small.

Shrub or tree 10-40 ft. high. Leaves lanceolate or ovate-lanceolate	1. <i>F. excorticata</i> .
Small shrub with long straggling branches. Leaves ovate or orbicular-ovate.	2. <i>F. Colensoi</i> .

** Flowers erect. Petals wanting.

Stems very slender, trailing. Leaves small, orbicular-ovate	3. <i>F. procumbens</i> .
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1. *F. excorticata*, Linn. f. *Suppl.* 217. — A shrub or small tree 40 ft. high; trunk usually 6-18 in. diam., but sometimes reaching 2-3 ft.; bark thin, loose and papery; branches brittle. Leaves alternate, 2-5 in. long including the slender petiole, ovate-lanceolate or lanceolate, acuminate, entire or obscurely and remotely toothed, thin and membranous, green above, pale and silvery beneath. Flowers $\frac{3}{4}$ -1 $\frac{1}{4}$ in. long, axillary, solitary, pendulous; peduncles long, slender. Calyx-tube inflated at the base, then suddenly contracted and again expanded into a funnel-shaped tube; lobes 4, acuminate, spreading. Petals 4, small. Stamens and style very variable in length. Berry oblong, purplish-black, juicy, $\frac{1}{2}$ in. long.—*Lindl. in Bot. Reg.* t. 857; *A. Cunn. Precur.* n. 533; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 56; *Handb. N.Z. Fl.* 75; *Kirk, Forest Fl.* t. 36, 36A; *Students' Fl.* 180. *Skinnera excorticata*, *Forst. Char. Gen.* 58; *Prodr.* n. 163; *A. Rich. Fl. Nouv. Zel.* 331.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from the North Cape southwards. Sea-level to over 3000 ft. Native *fuchsia*; *Kotukutuku*; the fruit *Konini*. August-December.

The flowers are trimorphic, there being a long-styled form in which the stamens have short filaments and often abortive anthers, and mid-styled and short-styled forms in which the stamens have longer filaments and perfect anthers, the last two apparently graduating into one another. For a detailed account see a paper by Mr. Kirk in the Transactions of the New Zealand Institute, vol. xxv., p. 261.

2. **F. Colensoi**, *Hook. f. Handb. N.Z. Fl.* 728.—A small shrub with long straggling branches, sometimes producing slender flexuous unbranched shoots several feet in length. Leaves alternate, very variable in size, $\frac{1}{2}$ –2 in. long including the petiole, ovate or orbicular-ovate, rounded or cordate at the base, thin and membranous, entire or obscurely toothed; petioles often longer than the blade. Flowers much as in *F. excorticata*, but shorter and proportionately broader, and petals smaller.—*Kirk, Students' Fl.* 181.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the Northern Wairoa River southwards, but often local. Sea-level to 1500 ft. October–February.

A very variable plant, large forms of which almost pass into *F. excorticata*.

3. **F. procumbens**, *R. Cunn. ex A. Cunn. Precur.* n. 534.—Stems very slender, much branched, prostrate and trailing, often several feet long. Leaves alternate; blade $\frac{1}{4}$ – $\frac{3}{4}$ in. long, rounded-ovate or almost orbicular, cordate at the base, obscurely sinuate-toothed, membranous; petioles very slender, longer than the blade. Flowers axillary, solitary, erect, $\frac{1}{2}$ – $\frac{3}{4}$ in. long; peduncles short, $\frac{1}{4}$ – $\frac{1}{2}$ in. Calyx-tube cylindric, without raised ridges, pale-orange; lobes sharply reflexed, purple at the tips, green at the base. Petals wanting. Stamens erect, always exserted; filaments slender. Style longer or shorter than the stamens, or equal to them. Berry large, oblong or obovoid, $\frac{3}{4}$ in. long, bright-red, glaucous.—*Hook. Ic. Plant.* t. 421; *Raoul, Choix*, 49; *Hook. f. Fl. Nov. Zel.* i. 57; *Handb. N.Z. Fl.* 76, 728; *Bot. Mag.* t. 6139; *Kirk, Students' Fl.* 181. *F. Kirkii*, *Hook. f. in Ic. Plant.* t. 1083.

NORTH ISLAND: Sandy and rocky places near the sea, rare and local. North Cape district, *J. Adams* and *T. F. C.*; Ahipara, *R. J. Matthews*; Matauri, *A. Cunningham*; Whangaruru, *Kirk*; Whangarei Heads and near Ngunguru, *T. F. C.*; Cape Colville Peninsula, *J. Adams*; Great Barrier Island, *Kirk*!

A beautiful and graceful little plant, remarkable for being the only species known with erect flowers. As in *F. excorticata*, the flowers are trimorphic. In the long-styled form the flowers are smaller and narrower, much less brightly coloured, the style is exserted far beyond the anthers, the stigma is very large, and the anthers rather smaller. The mid-styled and short-styled forms appear to vary into one another: in the first the style usually equals the anthers, in the second it is shorter and included within the calyx-tube. The stamens are of equal length in all the forms.

ORDER XXX. PASSIFLOREÆ.

Climbing herbs or shrubs, rarely erect. Leaves usually alternate, entire or lobed or palmately divided, stipulate; petiole generally provided with glands. Tendrils often present, axillary. Flowers

regular, hermaphrodite or unisexual, axillary, solitary or in cymes or racemes. Calyx-tube short or long; lobes 4-5, valvate or imbricate. Petals as many as the calyx-lobes or wanting, inserted on the calyx-tube, free or connate. Corona of one or more rows of filamentous appendages arising from the calyx-tube, rarely wanting. Stamens 3-5, rarely more, usually springing from the base of the calyx, but filaments often monadelphous and adnate to the stalk of the ovary to near the top. Ovary superior, free, elevated on a stalk (gynophore) or sessile, 1-celled, with 3-5 parietal placentas; styles 3-5 or single; ovules numerous, pendulous, anatropous. Fruit succulent or capsular. Seeds numerous, ovoid or compressed, often arillate; albumen fleshy; embryo straight, cotyledons flat.

A small order, chiefly tropical in its distribution, and most abundant in South America. Genera 18; species about 250. The fruit of several species of *Passiflora* (passion-fruit) is valued on account of the cooling and refreshing pulp surrounding the seeds; the large-fruited kind, known as grenadilla, being specially prized. The very different-looking papaw is now everywhere cultivated in the tropics for its large fruit, which, though insipid, is cooling and antiseptic. The only genus found in New Zealand (*Passiflora*) is mainly South American, but has a few outlying species in Australasia, the Pacific islands, and tropical Asia.

1. PASSIFLORA, Linn.

Climbing shrubs. Leaves simple or palmately lobed or divided, often with glands on the undersurface and petiole; tendrils axillary. Flowers axillary, solitary or racemose. Calyx-tube short, lobes 4-5. Petals 4-5, rarely wanting, inserted on the throat of the calyx. Corona of one or several rings of coloured filaments arising from the calyx-tube. Stamens as many as the calyx-lobes; filaments adnate to the stalk of the ovary; anthers versatile. Ovary superior, elevated on a long stalk or gynophore, 1-celled; styles 3; stigmas capitate. Fruit succulent or pulpy, indehiscent or obscurely 3-valved.

A large genus of over 120 species, chiefly tropical, and most plentiful in South America. The New Zealand species is endemic, and constitutes the section *Tetraphthæa*, characterized by the unisexual tetramerous flowers and ebracteate peduncles.

1. *P. tetrandra*, Banks and Sol. ex D.C. Prodr. iii. 323.—A glabrous climber, ascending to the tops of the highest trees; trunk woody, often 3-4 in. diam.; branches slender, terete. Leaves alternate, petiolate, 1-4 in. long, oblong-lanceolate or ovate-lanceolate, acuminate, eglandular, quite entire, smooth and glossy; tendrils slender, elongated. Flowers unisexual, greenish, $\frac{1}{2}$ in. diam., in 2-4-flowered cymes or solitary; pedicels slender, jointed about the middle. Calyx-lobes 4, oblong, obtuse. Petals the same number and about the same size. Corona of numerous yellowish filaments. Male flowers with 4 stamens; filaments long, diverging. Females with a stipitate ovary, usually with short barren stamens at the base; styles 2 or 3. Fruit nearly globose, orange, 1-1 $\frac{1}{2}$ in.

diam. Seeds very numerous, compressed, wrinkled, black.—*A. Cunn. Precur.* n. 524; *Hook. f. Fl. Nov. Zel.* i. 73; *Handb. N.Z. Fl.* 81; *Kirk, Students' Fl.* 182. *Tetraphathæa australis*, *Raoul, Choix*, t. 27.

NORTH AND SOUTH ISLANDS: From the North Cape as far south as Banks Peninsula, ascending to 2500 ft. *Kohia.* November–January.

ORDER XXXI. CUCURBITACEÆ.

Climbing or prostrate herbs. Leaves alternate, exstipulate, usually palmately veined or lobed. Tendrils generally present, springing from the sides of the stem near the petioles, simple or divided. Flowers monœcious or diœcious, solitary or in racemes or panicles. Calyx-tube adnate to the ovary; limb campanulate or rotate or tubular, 3–5-lobed; lobes imbricate. Petals 3–5, inserted on the calyx-limb, free or united into a lobed corolla, often confluent with the calyx below. Stamens 3 or 5, inserted on the calyx-tube; filaments free or connate into a tube or column; anthers free or united, one 1-celled, the others 2-celled; cells often long and sinuous. Ovary inferior, usually 1-celled when very young, with 3 (rarely 4–5) parietal placentas, which thicken and turn inwards, meeting in the axis, so that the ovary becomes spuriously 3–6-celled; style simple, entire or 3-fid; ovules 1 or more to each placenta. Fruit succulent or coriaceous, indehiscent or bursting irregularly. Seeds usually many, generally flat; albumen wanting; embryo straight, cotyledons large.

A natural and well-defined order, spread over the tropics and warmer portions of the temperate zones, nearly absent in cold climates. Genera about 70; species nearly 500. The order is mainly important on account of the edible fruits which many species produce, as the pumpkin, melon, water-melon, cucumber, &c. Others are acrid and purgative, as colocynth and bryony, and are used in medicine. The common gourd (*Lagenaria vulgaris*), the hard-rinded fruit of which is so extensively used in the tropics for water-vessels, &c., was introduced into New Zealand by the Maoris, and cultivated by them long before the advent of Europeans, but is now seldom seen. The sole indigenous genus (*Sicyos*) occurs in America, the Pacific islands, and Australasia.

1. *SICYOS*, Linn.

Climbing or prostrate herbs. Leaves angular or 3–5-lobed. Flowers small, monœcious. Male flowers racemose. Calyx-tube broadly campanulate, 5-toothed. Corolla rotate, deeply 5-partite. Stamens connate into a short column; anthers 2–5, sessile at the top of the column, sinuous; cells confluent. Female flowers capitate on a short peduncle, rarely solitary. Calyx-tube adnate with the ovary; limb and corolla as in the males. Ovary 1-celled; style short, 3-fid; ovule solitary, pendulous. Fruit small, coriaceous, dry, indehiscent, covered with barbed spines.

A small genus of about 20 species, mainly from tropical America, but extending to Australia and the Pacific islands. The single New Zealand species has the range of the genus.

1. **S. angulata**, Linn. *Sp. Plant.* 1013. — Stems trailing or climbing, usually from 2 ft. to 10 ft. long but sometimes much more, glabrous or more or less scabrid. Leaves on long petioles, 2–6 in. diam. or more, ovate-cordate to reniform, palmately 5–7-lobed, the central lobe the longest, membranous, scabrid with short stiff hairs or almost glabrous; tendrils very long, branched. Flowers $\frac{1}{3}$ in. diam., greenish; males racemose on a long peduncle; females often from the same axil, capitate on a short peduncle. Fruits clustered, $\frac{1}{2}$ in. long, ovoid, compressed, densely covered with barbed spines. — *Forst. Prodr.* n. 363; *A. Rich. Fl. Nouv. Zel.* 323; *Hook. f. Fl. Nov. Zel.* i. 72; *Handb. N.Z. Fl.* 82; *Benth. Fl. Austral.* iii. 322; *Kirk, Students' Fl.* 183. *S. australis*, *Endl. Prodr. Fl. Norf.* 67; *A. Cunn. Precur.* n. 525.

KERMADEC ISLANDS: Abundant, attaining a large size, *McGillivray, T. F. C.*
 NORTH ISLAND: In various places on the coast, as far south as Hawke's Bay; more plentiful on the outlying islands than on the mainland. SOUTH ISLAND: Queen Charlotte Sound, *Banks and Solander.* *Mawhai.* November–March. Also in North and South America, Australia, Norfolk Island, Lord Howe Island, and Polynesia.

ORDER XXXII. FICOIDEÆ.

Annual or perennial herbs, rarely undershrubs, of very various habit. Leaves opposite or alternate or whorled, simple, often fleshy, stipules wanting or scarious. Flowers regular, usually hermaphrodite, solitary or fascicled or cymose. Calyx free or adnate to the ovary, 4–5-celled or -partite, imbricate. Petals either narrow and numerous, or 4–5 and small, or altogether wanting. Stamens perigynous or rarely hypogynous, few or many; filaments free or connate at the base. Ovary superior or inferior, 2–5-celled; styles as many as the cells, free or united at the base; ovules either solitary in the cells and basal, or numerous and axile. Fruit generally a capsule with loculicidal or transverse dehiscence, more rarely drupaceous or separating into 1-seeded cocci. Seeds solitary or many, usually compressed; albumen scanty or copious; embryo slender, curved round the albumen, terete.

A large order, comprising 22 genera and nearly 500 species, mostly tropical or sub-tropical, and especially plentiful in South Africa; rare or absent in cold climates. The properties of the order are unimportant. Many species of *Mesembryanthemum* have showy flowers, and are cultivated in gardens; and *Tetragonia* is occasionally used as a pot herb. The remaining genera are mostly insignificant weeds. Both the New Zealand genera are widely distributed, although much more numerous represented in South Africa than elsewhere.

1. MESEMBRYANTHEMUM, Linn.

More or less succulent herbs or undershrubs. Leaves usually opposite, thick and fleshy, trigonous or terete or flat. Flowers conspicuous, terminating the branches or axillary. Calyx-tube adnate with the ovary; lobes 5. Petals numerous, linear, in one or several rows. Stamens numerous, in many rows. Ovary inferior,

with 5 or more cells, rarely 4-celled; styles as many as the cells, free or connate at the base, stigmatic on the inner side; ovules very numerous. Capsule enclosed in the persistent calyx, depressed at the apex and loculicidally dehiscent, the valves opening in a starlike manner. Seeds numerous, minute; testa crustaceous.

An enormous South African genus, containing fully 300 species; rare elsewhere, although a few species are widely scattered along the shores of many parts of the world.

Leaves less than 1 in. long. Flowers $\frac{3}{4}$ –1 in. diam.;
peduncles usually short 1. *M. australe*.
Leaves more than 1 in. long. Flowers $1\frac{1}{2}$ in. diam., on
long peduncles 2. *M. æquilaterale*.

1. *M. australe*, *Sol. ex Forst. Prodr.* n. 523.—Stems 1–4 ft. long, prostrate and rooting at the nodes, woody, terete. Leaves opposite or in opposite fascicles, connate at the base, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, linear or linear-oblong, triquetrous, flat above, convex and keeled beneath, acute or obtuse, thick and fleshy, often glaucous. Flowers $\frac{3}{4}$ –1 in. diam., white or pink; peduncles usually shorter than the leaves, but sometimes nearly twice their length. Calyx-tube fleshy, obconic; lobes 5, 2 of them much longer than the others. Petals very numerous, spreading. Styles 5–8. Capsule 5–8-celled.—*A. Cunn. Precur.* n. 522; *Raoul, Choix*, 48; *Hook. f. Fl. Nov. Zel.* i. 76; *Handb. N.Z. Fl.* 83; *Benth. Fl. Austral.* iii. 324; *Kirk, Students' Fl.* 184.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Common everywhere on the coasts. *Horokaka.* October–March. Also abundant in Australia and Tasmania, Norfolk Island, and Lord Howe Island.

2. *M. æquilaterale*, *Haw. Misc. Nat.* 77.—Stems robust, woody at the base, prostrate or ascending, sometimes several feet in length; flowering branches short, suberect. Leaves opposite, stem-clasping, 1–3 in. long, very fleshy, linear, acutely triquetrous, smooth, equal-sided or laterally compressed. Flowers $1\frac{1}{2}$ in. diam.; peduncles 1–3 in. long, thickened upwards, winged. Calyx-tube turbinate, $\frac{1}{2}$ in. long or more; lobes unequal, the 2 larger ones often as long as the tube. Petals spreading. Styles 6–10. Capsule 6–10-celled.—*Benth. Fl. Austral.* iii. 324; *Kirk, Students' Fl.* 184.

NORTH ISLAND: Coast near Napier; Castle Point, *Kirk!* December–February. A common plant in Australia and Tasmania, also found in California and Chili.

2. TETRAGONIA, Linn.

Herbs or undershrubs. Stems trailing or erect. Leaves alternate, petiolate, flat but more or less succulent. Flowers axillary, solitary or few together. Calyx-tube adnate to the ovary and often produced above it, terete or angled; lobes 3–5. Petals wanting. Stamens inserted on the calyx-tube, variable in number, solitary or few or many. Ovary inferior, 2–8-celled; styles as many

as the cells; ovules solitary in each cell, pendulous. Fruit indehiscent, globose or obconic, often horned or tuberculate; endocarp hard or almost bony; epicarp coriaceous or fleshy.

A small genus of about 25 species, most of which are natives of South Africa, a few only being scattered over the coasts of America, Australasia, and parts of Asia.

Leaves 1-4 in. Fruit turbinate, hard, angular, horned

above 1. *T. expansa*.

Leaves $\frac{3}{4}$ -2 in. Fruit globose, succulent, not horned .. 2. *T. trigyna*.

1. ***T. expansa***, Murr. in *Comm. Gotting.* vi. (1783) 13.—A more or less succulent minutely papillose herb. Stems 1-2 ft. high, decumbent or suberect, glabrous or sparingly puberulous. Leaves 1-4 in. long, ovate-rhomboid or triangular, obtuse or subacute, suddenly narrowed into the petiole, quite entire or very obscurely sinuate. Flowers small, yellowish, solitary or rarely 2 together, sessile or on very short peduncles. Calyx-tube broadly turbinate; lobes about as long as the tube, broad, obtuse. Stamens 12-20, irregularly inserted. Ovary 3-8-celled; styles the same number. Fruit about $\frac{1}{2}$ in. long, hard and dry, almost turbinate, angular, usually furnished at the summit with 2-4 prominent teeth or horns.—*A. Rich. Fl. Nouv. Zel.* 320; *A. Cunn. Precur.* n. 523; *Raoul, Choix*, 48; *Hook. f. Fl. Nov. Zel.* i. 77; *Handb. N.Z. Fl.* 84; *Benth. Fl. Austral.* iii. 325; *Kirk, Students' Fl.* 185. *T. halmifolia*, *Forst. Prodr.* n. 223.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon along the coasts; seldom found inland. *Kokihi.* November-February.

This has long been cultivated in Europe as an edible plant, under the name of "New Zealand spinach." It is also a native of Australia and Tasmania, Norfolk Island and Lord Howe Island, Japan, and extra-tropical South America.

2. ***T. trigyna***, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i. 77.—Stems 1-8 ft. long, branched, trailing or almost climbing, terete, woody at the base. Leaves $\frac{3}{4}$ -2 in. long, broadly ovate-rhomboid or rounded-ovate, obtuse, abruptly narrowed into the petiole, fleshy, usually covered with transparent papillæ. Flowers small, yellowish, solitary or rarely 2 together; peduncles about as long as the flower. Ovary 2- rarely 3-celled; styles the same number as the cells. Fruit $\frac{1}{4}$ in. diam., subglobose, succulent, bright-red, obscurely lobed or quite even, not horned. Seeds 1-3.—*Handb. N.Z. Fl.* 84; *Kirk, Students' Fl.* 185. *T. implexicoma* var. *chathamica*, *F. Muell. Veg. Chath. Is.* 12.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: In many places on the shores, but often local. November-February.

Easily distinguished from *T. expansa* by the trailing habit, smaller broader leaves, and bright-red fleshy fruit. The flowers are often unisexual. It is probably identical with the Australian and Tasmanian *T. implexicoma*, *Hook. f.*

ORDER XXXIII. UMBELLIFERÆ.

Herbs, very rarely climbing or shrubby, often aromatic when bruised. Stems often grooved or channelled, solid or hollow. Leaves alternate, usually much cut and divided but sometimes simple and entire; petiole dilated and sheathing at the base; stipules wanting (except in *Hydrocotyle*). Flowers small, hermaphrodite or occasionally polygamous, in terminal or lateral umbels which are either simple or compound. Umbels usually furnished at the base with a ring of bracts, those below the primary (or general) umbel forming the involucre, those below the secondary (or partial) ones constituting the involucl. Calyx adnate to the ovary, limb either obsolete or 5-toothed. Petals 5, inserted at the margin of an epigynous disc, the outer often larger, imbricate or valvate, usually inflexed at the tip. Stamens 5, epigynous; filaments curved inwards. Disc epigynous, often 2-lobed and confluent with the base of the styles. Ovary inferior, 2-celled; styles 2, distinct; ovules 1 in each cell, pendulous. Fruit of 2 dry indehiscent carpels cohering by their inner faces (*commissure*), when ripe separating from a filiform central axis (*carpophore*), from the top of which they often remain suspended for a time. Each carpel (*mericarp*) generally bears 5 longitudinal ridges, sometimes expanded into wings. In the spaces or furrows between the ridges, and imbedded in the pericarp, are one or more longitudinal oil-canals (*vittæ*). Secondary ridges are also sometimes placed between the primary ones. Seeds 1 to each carpel, pendulous; albumen abundant, horny; embryo minute, next the hilum, radicle superior.

A very large and extremely distinct order, represented all over the world, but most plentiful in western Asia, south Europe, and north Africa; rarer in the tropics and in the south temperate zone. Genera about 160; species estimated at 1500. The properties of the order are extremely varied. Several species secrete a poisonous and narcotic acrid sap, as hemlock, fool's parsley, water drop-wort, &c. Others are characterized by the presence of a gum-resin, as *Asafoetida* and *Galbanum*. Many species produce aromatic and carminative fruits, as caraway, coriander, dill, &c. The chief edible species are the carrot and parsnip, where the roots alone are eaten; and celery, parsley, and fennel, where the leaves and stems are employed. Of the 11 New Zealand genera, *Aciphylla* and *Actinotus* extend to Australia; *Azorella* and *Oreomyrrhis* occur in South America and the Antarctic islands as well. The remaining 7 are all widely distributed.

* Umbels simple (sometimes irregularly compound in *Azorella*).

a. *Vittæ* absent.

Creeping herbs with scarious stipules. Fruit laterally much compressed	1. HYDROCOTYLE.
Tufted or creeping. Fruit hardly compressed, subquadrate. Leaves and involucre spinous. Umbels contracted into a compact spike or head	2. AZORELLA.
Tufted or creeping. Ovary 1-celled, 1-ovuled. Carpel solitary	3. ERYNGIUM.
	4. ACTINOTUS.

b. Vittæ present.

- Tufted or diffuse. Leaves much dissected. Fruit narrow above, nearly terete 6. *OREOMYRRHIS*.
 Aquatic. Stem creeping. Leaves terete, fistular, septate 7. *CRANTZIA*.

**** Umbels regularly compound. Vittæ present (obscure in some). Primary ridges of the fruit alone conspicuous.**

- Littoral. Stems decumbent. Involucre wanting. Carpels nearly terete 5. *APIUM*.
 Leaf-segments ending in acicular or spinous points. Umbels in erect spikes or panicles 8. *ACIPHYLLA*.
 Leaves pinnate or decompound. Umbels terminal. Carpels with 3-5 narrow equal wings 9. *LIGUSTICUM*.
 Leaves pinnate or 1-3-foliolate in the New Zealand species. Carpels with 2 broad lateral wings 10. *ANGELICA*.

***** Umbels regularly compound. Secondary ridges of the fruit prominent, covered with bristles 11. DAUCUS.**

1. **HYDROCOTYLE**, Linn.

Prostrate herbs. Stems long, slender, rooting at the nodes, often matted. Leaves orbicular or reniform, deeply cordate or peltate, palmately toothed or lobed or divided, rarely entire, long-petioled; stipules small, scarious. Umbels simple, small; involucreal leaves usually inconspicuous or wanting. Flowers small, sometimes unisexual. Calyx-teeth minute or obsolete. Petals entire, valvate or imbricate. Fruit laterally compressed, with a narrow commissure; carpels flat, placed edge to edge, with 1 or more prominent ribs on each face; vittæ wanting. Seed straight, laterally compressed.

A genus of about 80 species, spread over the warm and temperate regions of the world, but most numerous in the Southern Hemisphere. Of the 9 New Zealand species 1 has a wide range in tropical and subtropical countries, another is found in North and South America, 2 occur in Australia, the remainder appear to be endemic.

Section I. (Euhydrocotyle). Involucreal bracts narrow or inconspicuous or wanting. Petals valvate. Carpels without secondary ribs or reticulations.

- Leaves deeply 3-7-lobed. Peduncles exceeding the leaves.
 Fruits on long slender pedicels 1. *H. elongata*.
 Leaves 3-5-foliolate; leaflets cuneate. Peduncles shorter than the leaves. Umbels 2-6-flowered 2. *H. tripartita*.
 Leaves 3-7-lobed almost to the base. Umbels 20-40-flowered; peduncles longer or shorter than the leaves .. 3. *H. dissecta*.
 Leaves thin, with 5-7 shallow lobes. Umbels 3-7-flowered, sessile or on very short peduncles (sometimes half as long as the petioles in var. *heteromeria*) 4. *H. americana*.
 Glabrous or nearly so. Leaves obscurely 3-7-lobed. Umbels 3-8-flowered. Carpels large, flat, with a broad dorsal wing 5. *H. pterocarpa*.
 Pilose or nearly glabrous. Leaves obscurely 3-7-lobed. Umbels 5-12-flowered. Carpels rounded on the dorsal edge 6. *H. novæ-zealandicæ*.

Hispidly pilose. Leaves sharply 5-7-lobed. Umbels 10-20-flowered. Carpels acute on the dorsal edge .. 7. *H. moschata*.
 Small, glabrous or nearly so. Leaves $\frac{1}{10}$ - $\frac{1}{3}$ in., 5-7-lobed. Umbels 2-6-flowered. Carpels rounded on the dorsal edge .. 8. *H. microphylla*.

Section II. (Centella). Involucral bracts conspicuous, broad. Petals imbricate. Carpels with secondary ribs and reticulations.

Leaves fascicled, broadly cordate. Umbels 2-3-flowered. Carpels large .. 9. *H. asiatica*.

1. *H. elongata*, A. Cunn. *Precur.* n. 495.—More or less softly pilose, rarely almost glabrous. Stems 4-12 in. long, very slender, branched, creeping and rooting at the nodes. Leaves $\frac{1}{2}$ -1 in. diam., orbicular-reniform, deeply 3-7-lobed; lobes rounded, acutely toothed; petioles slender, 1-3 in. long or more; stipules small. Peduncles very slender, exceeding the leaves; umbels 10-30-flowered. Flowers minute, on slender pedicels. Fruit small, brownish, $\frac{1}{12}$ in. diam., more or less pubescent or bristly; carpels with one rib on each face.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 84; *Handb. N.Z. Fl.* 85; *Kirk, Students' Fl.* 187. *H. concinna*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 239. *H. echinella*, *Col. l.c.* xx. (1888) 191.

NORTH AND SOUTH ISLANDS: Not uncommon from the North Cape southwards. Sea-level to 2000 ft. November-March.

A very distinct plant, easily recognised by the large size, softly pilose habit, deeply lobed leaves, long peduncles, and pedicelled flowers.

2. *H. tripartita*, R. Br. ex A. Rich. *Hydrocot.* 69, t. 61, f. 25.—Usually densely matted, dark-green, smooth and shining, glabrous or nearly so. Stems branched, filiform, creeping and rooting at the nodes, 1-4 in. long. Leaves coriaceous or fleshy, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., 3-5-partite to the base; leaflets cuneate, 2-3-toothed or -lobed at the tip or quite entire; petioles $\frac{1}{2}$ -2 in. long; stipules rather large, entire. Peduncles slender, shorter than the leaves; umbels 2-6-flowered. Flowers small, shortly pedicelled or sessile. Fruit small, rather turgid, brownish, glabrous. Carpels rounded at the back, convex on the sides, with one obscure rib on each face.—*Hook. f. Fl. Nov. Zel.* i. 83; *Benth. Fl. Austral.* iii. 341; *Kirk, Students' Fl.* 188. *H. muscosa*, R. Br. ex A. Rich. *l.c.* 68, t. 61, f. 27; *Hook. f. Handb. N.Z. Fl.* 86.

Var. *hydrophila*.—Much smaller and more delicate; stems $\frac{1}{2}$ -1 in. long. Leaves $\frac{1}{8}$ - $\frac{1}{2}$ in. diam.; leaflets minute, entire or with 2-3 shallow crenatures. Umbels 1-2-flowered. Fruit much smaller, but otherwise as in the type.—*H. hydrophila*, *Petrie in Trans. N.Z. Inst.* xxix. (1897) 425.

NORTH ISLAND: Hawke's Bay and Tongariro, *Colenso!* Var. *hydrophila*: Lower Waikato River, *Carse!* Matata (Bay of Plenty), *Petrie!* SOUTH ISLAND, STEWART ISLAND: Not uncommon in marshy places. Var. *hydrophila*: Otago—Tomahawk Lagoon, *Petrie!* Wickliffe Bay, Bluff, B. C. *Aston!*

The trifoliate leaves at once separate this from all the other New Zealand species. Mr. Petrie's *H. hydrophila* has no distinguishing characters apart from its much smaller size. The typical form is also found in Australia and Tasmania.

3. *H. dissecta*, Hook. f. *Fl. Nov. Zel.* i. 84.—Small, slender, matted, more or less hispid-pilose. Stems much branched, creeping and rooting, 3–9 in. long. Leaves alternate or in alternate fascicles, $\frac{1}{3}$ –1 in. diam., orbicular or orbicular-reniform, 3–7-lobed almost to the base; lobes obovate-cuneate, acutely toothed or almost laciniate, hairy on both surfaces; petiole $\frac{1}{2}$ –1½ in. long. Peduncles variable in length, $\frac{1}{2}$ –2 in. long, longer or shorter than the leaves; umbels 20–40-flowered. Flowers small, sessile. Fruit densely crowded, small, red-brown, glabrous; carpels somewhat turgid, with one obtuse rib on each face; margins acute.—*Handb. N.Z. Fl.* 86; *Kirk, Students' Fl.* 188.

NORTH ISLAND: Near Maunganui Bluff, *Petrie! Northern Wairoa, T. F. C.; Whangarei, Carse! Petrie! T. F. C.; Matakana, Kirk! Hunua, Kirk! T. F. C.; Lower Waikato, Carse! Hawke's Bay, Colenso.* SOUTH ISLAND: Marlborough, *Macmahon! near Westport, Townson! Otira Valley and Catlin's River, Petrie!* Sea-level to 1200 ft. November–February.

A well-marked plant, perhaps more closely allied to *H. moschata* than to any other, but differing widely in the deeply and sharply lobed leaves. Mr. Carse sends a form with proliferous umbels.

4. *H. americana*, Linn. *Sp. Plant.* 234.—Small, very slender, matted, pale-green and glistening, glabrous or with a few loose hairs on the petioles. Stems 3–6 in. long, filiform, much branched. Leaves very delicate and membranous, $\frac{1}{4}$ – $\frac{3}{4}$ in. diam., orbicular-reniform, 5–7-lobed; lobes shallow, crenate; petioles $\frac{1}{2}$ –1½ in. long; stipules small. Umbels small, 3–6-flowered, sessile in the axils of the leaves or very shortly peduncled. Flowers sessile or nearly so. Fruit minute, pale yellowish-brown, glabrous, or one or both carpels more or less hispid; carpels with one rib on each face, margins acute.—*Hook. f. Fl. Nov. Zel.* i. 82; *Handb. N.Z. Fl.* 85; *Kirk, Students' Fl.* 187.

Var. *heteromeria*, *Kirk, l.c.* 188.—Rather larger. Leaves $\frac{1}{2}$ –1 in. diam.; petioles often 2 in. long. Umbels usually shortly peduncled; peduncles sometimes half the length of the petioles. Fruit as in the type.—*H. heteromeria*, *A. Rich. Hydrocot.* 200; *A. Cunn. Precur.* n. 499; *Hook. f. Fl. Nov. Zel.* i. 82; *Handb. N.Z. Fl.* 86. *H. nitens*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 386.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the North Cape southwards. Sea-level to 2000 ft. October–February. The typical form is also found in North and South America.

5. *H. pterocarpa*, *F. Muell. in Trans. Vict. Inst.* i. (1855) 126.—Smooth, often shining, perfectly glabrous or sparingly pilose. Stems slender, 6–14 in. long, branched, creeping and rooting. Leaves $\frac{1}{2}$ –1 in. diam., orbicular-reniform with a narrow or closed sinus, very thin and membranous, obscurely 3–7-lobed; lobes

crenate; petioles slender, 1-4 in. long. Peduncles rather slender, shorter than the leaves; umbels 3-8-flowered. Flowers shortly pedicelled or almost sessile. Fruit large, flat, broader than long, notched above and below, often mottled; carpels with one rib on each face, and with the dorsal edge expanded into a broad wing.—*Hook. f. Fl. Tasm.* i. 153, t. 33; *Handb. N.Z. Fl.* 86; *Kirk, Students' Fl.* 188.

NORTH AND SOUTH ISLANDS: In lowland swamps from Mongonui to North Canterbury, but often local. December-February. Also in Victoria and Tasmania.

6. *H. novæ-zealandiæ*, *D.C. Prodr.* iv. 67.—Very variable in size and habit of growth. Stems 3-12 in. long, much or sparingly branched, open or matted, creeping and rooting at the nodes, sometimes ascending at the tips, pilose or almost glabrous. Leaves $\frac{1}{4}$ -1 $\frac{1}{4}$ in. diam., orbicular-reniform with usually an open sinus, obscurely 5-9-lobed or -angled; lobes shallow, obscurely and obtusely crenate, rarely more acutely toothed, usually membranous but sometimes subcoriaceous, sparingly hairy or nearly glabrous; petioles $\frac{1}{2}$ -3 in. long, slender, usually pilose with reversed hairs above. Peduncles shorter than the leaves; umbels 5-12-flowered. Flowers shortly pedicelled. Fruit $\frac{1}{2}$ in. diam., broader than long, somewhat flattened, glabrous, pale-brown, sometimes mottled; carpels rounded at the back, with an indistinct rib or groove on each face.—*A. Cunn. Precur.* n. 497; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 83; *Handb. N.Z. Fl.* 86; *Kirk, Students' Fl.* 189. *H. dichondræfolia*, *A. Cunn. l.c.* n. 498. *H. intermixta*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 240. *H. alsophila*, *Col. l.c.* xviii. (1886) 261. *H. involucrata*, *Col. l.c.* xix. (1887) 262. *H. amœna*, *Col. l.c.* xxi. (1889) 83.

Var. **robusta**.—Stems stout, suberect above. Fruit large, $\frac{1}{2}$ in. broad, turgid; carpels with a groove on each face.—*H. robusta*, *Kirk, Students' Fl.* 189.

Var. **montana**, *Kirk, l.c.*—Stems stout, creeping, densely matted. Leaves usually with a narrow sinus, coriaceous, glabrous or nearly so, lobes shallow. Carpels with a groove on each face.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, var. *montana* ascending to quite 4,000 ft. Var. *robusta*: Sandy beaches north of Auckland, rare. November-March.

A very variable plant, but one that can generally be recognised without much difficulty by the shallow and rounded lobes of the leaves, and by the compressed fruits with thick obtuse margins. I am unable to maintain Mr. Kirk's *H. robusta* as a separate species, the differences between it and the typical state being of a very trivial character. Closely allied to it is a large-leaved species gathered by Mr. Cockayne in forests in the Chatham Islands, in which the leaves are sometimes 2 in. diam.

7. *H. moschata*, *Forst. Prodr.* n. 135.—More or less hispid or pilose, rarely almost glabrous. Stems 2-12 in. long, much branched, often densely matted, creeping and rooting at the nodes. Leaves $\frac{1}{2}$ -1 in. diam., reniform or orbicular with usually an open sinus,

distinctly 5-7-lobed; lobes sharply toothed, usually hispid on both surfaces but sometimes glabrescent, firm or almost coriaceous; petioles rather stout, $\frac{1}{8}$ -2 in. long, usually pilose above with reversed hairs. Peduncles longer or shorter than the leaves; umbels 5-40-flowered. Flowers sessile or nearly so. Fruits usually densely crowded, minute, $\frac{1}{20}$ - $\frac{1}{15}$ in. diam., red-brown; carpels acute at the back, with an acute keel or ridge on each face.—*A. Cunn. Precur.* n. 501; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 83; *Handb. N.Z. Fl.* 87; *Kirk, Students' Fl.* 1-9. *H. subthorpioides*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 83.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant throughout, ascending to 2000 ft. November-March.

Closely allied to *H. novæ-zealandiæ*, but separated by the distinctly lobed leaves, by the lobes being acutely toothed, and by the much smaller crowded fruits, which are sharply keeled on the back.

8. *H. microphylla*, *A. Cunn. Precur.* n. 496.—Glabrous or with a few loose hairs on the petioles and peduncles. Stems 1-3 in. long, slender or rather stout at the base, creeping and rooting, often matted. Leaves $\frac{1}{10}$ - $\frac{1}{3}$ in. diam., orbicular-reniform with usually a closed or narrow sinus, 5-7-lobed; lobes shallow, rounded, obtusely crenate; petiole $\frac{1}{5}$ - $\frac{1}{2}$ in. long; stipules rather large for the size of the plant. Peduncles variable in length, longer or shorter than the leaves; umbels 2-6-flowered. Flowers sessile or nearly so. Fruit minute, glabrous, $\frac{1}{20}$ - $\frac{1}{15}$ in. diam.; carpels rounded at the back, with an obscure rib or groove on each face.—*Hook. f. Fl. Nov. Zel.* i. 84; *Handb. N.Z. Fl.* 87; *Kirk, Students' Fl.* 190.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Mongonui southwards, but apparently local. December-February.

Cunningham's original description is not at all good, and without access to his specimens I cannot be certain that the plant described above is the same as his. It differs from *H. novæ-zealandiæ* in the smaller size, glabrous and more deeply divided leaves, few-flowered umbels, and smaller fruit. From *H. moschata* it is at once removed by the round-edged carpels.

9. *H. asiatica*, *Linn. Sp. Plant.* 234.—Very variable in size. Stems rather stout, much branched, creeping and rooting at the nodes. Leaves fascicled at the nodes, $\frac{1}{4}$ -1 in. diam., orbicular or oblong-reniform, cordate or almost truncate at the base, sinuate-toothed or nearly entire, glabrous or slightly pubescent; petioles very variable in length, $\frac{1}{2}$ -6 in. or more, often laxly pubescent above. Peduncles short, $\frac{1}{4}$ -1 in. long, rarely more; umbels 2-4-flowered; bracts 2-3, broad, ovate. Fruit $\frac{1}{8}$ - $\frac{1}{6}$ in. diam.; carpels with about 3 stout ribs on each face, but often showing the secondary ribs when young, somewhat reticulated, margins obtuse.—*A. Cunn. Precur.* n. 502; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.*

i. 82; *Handb. N.Z. Fl.* 86; *Benth. Fl. Austral.* iii. 346; *Kirk, Students' Fl.* 190. *H. cordifolia*, *Hook. f. Ic. Plant.* t. 303. *H. uniflora*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 239.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in moist places from the Three Kings Islands and the North Cape southwards, ascending to 2500 ft. October-March. Also in most tropical and subtropical countries.

2. AZORELLA, Lam.

Perennial herbs, densely tufted or slender and creeping. Leaves simple or 3-5-foliolate, all radical, or fascicled at the nodes of creeping stolons, or cauline and densely imbricated. Umbels few- or many-flowered, simple or irregularly compound; involucre bracts free or connate. Calyx-teeth prominent, usually small, acute. Petals obtuse or acute, imbricate. Disc thick, flat, often confluent with the styles. Fruit but slightly laterally compressed, almost tetragonous, the sides furrowed at the commissure when mature. Carpels subterete or dorsally compressed, with 5 more or less prominent and almost equidistant ribs, the lateral ones not close to the commissure.

A genus comprising about 40 species, found in Andine and extra-tropical South America, Australia and Tasmania, the Antarctic islands, and New Zealand. With the exception of *A. Selago*, all the New Zealand species are endemic.

Section I. (Fragosa). Stems closely compacted, forming rounded pulvinate masses.

Leaves all cauline, imbricate; blade 3-5-partite .. 1. *A. Selago*.

Section II. (Schizeleima). Stems tufted, often emitting creeping stolons or leafy flowering branches.

* Leaves simple.

- | | |
|---|---------------------------|
| Minute, forming tufts $\frac{1}{2}$ -2 in. diam. Leaves $\frac{1}{8}$ - $\frac{1}{4}$ in. diam., entire or crenate | 2. <i>A. exigua</i> . |
| Leaves reniform, $\frac{1}{3}$ - $\frac{3}{4}$ in. diam. Stipules entire. Umbels 3-8-flowered. Pedicels shorter than the fruits | 3. <i>A. reniformis</i> . |
| Leaves reniform, $\frac{1}{3}$ -2 in. diam. Stipules ciliate. Umbels many-flowered. Pedicels longer than the fruits | 4. <i>A. Haastii</i> . |

** Leaves 3-5-foliolate.

- | | |
|---|-------------------------------|
| Leaves tufted, coriaceous, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. diam; leaflets 3-5, deeply crenate-toothed or lobed | 5. <i>A. Roughii</i> . |
| Leaves crowded at the nodes of creeping stolons, excessively coriaceous, $\frac{1}{4}$ - $\frac{3}{4}$ in. diam.; leaflets bluntly lobed or crenate | 6. <i>A. hydrocotylodes</i> . |
| Leaves tufted, pale-green, membranous, $\frac{1}{3}$ - $\frac{3}{4}$ in. diam.; leaflets 3, toothed at the tips | 7. <i>A. pallida</i> . |
| Small, densely matted. Leaves $\frac{1}{6}$ - $\frac{1}{3}$ in. diam.; leaflets 3, entire or obscurely toothed | 8. <i>A. nitens</i> . |
| Creeping. Leaves fascicled at the nodes, membranous, $\frac{1}{3}$ - $\frac{3}{4}$ in. diam.; leaflets 3, stalked, obscurely toothed | 9. <i>A. trifoliolata</i> . |

1. **A. Selago**, *Hook. f. Fl. Antarct.* ii. 284, t. 99. — Stems densely tufted, branched, forming large globular masses 1–4 ft. diam. or more, quite glabrous. Leaves alternate, imbricate, $\frac{1}{5}$ – $\frac{1}{3}$ in. long; petiole half the length, very broad, membranous, closely sheathing the stem; blade much dilated, broader than long, closely appressed, concave, coriaceous, 3–5-partite to the middle, upper surface furnished with several long stiff bristles; lobes spreading, oblong, acute or apiculate; margins quite entire, much thickened. Umbels almost concealed amongst the uppermost leaves, shortly pedunculate, 3-flowered. Involucral leaves linear, subacute. Calyx-teeth acute. Fruits ovoid, terminated by the elongated styles; carpels slightly compressed, convex on the back, 5-ribbed, contracted at the commissure.—*Phil. Trans. Roy. Soc.* clxviii. 20; *Kirk, Students' Fl.* 191

MACQUARIE ISLAND: *Fraser, Prof. Scott! A. Hamilton!* Also in Kerguelen Island, the Crozets, Marion and Heard I-lands, and Fuegia.

2. **A. exigua**, *Benth. and Hook. f. in Gen. Plant.* i. 875. — Small, stemless, forming little tufts $\frac{1}{2}$ –2 in. diam. Leaves numerous, crowded at the top of a short and stout rhizome, $\frac{1}{4}$ – $\frac{3}{4}$ in. long; petiole long, stout, sheathing at the base; blade minute, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam., ovate-orbicular, obscurely 3-lobed or crenate, cordate or rounded at the base, coriaceous, minutely papillose above; margins recurved. Scapes shorter than the leaves, 3–8-flowered; involucral leaves linear, obtuse, rounded at the base. Fruit $\frac{1}{12}$ in. long, almost tetragonous; carpels 5-ribbed, rounded at the back.—*Kirk, Students' Fl.* 191. *Pozoa exigua*, *Hook. f. Handb. N.Z. Fl.* 87.

SOUTH ISLAND: Otago—Black Peak, *Hector and Buchanan!* Hector Mountains and Mount Cardrona, *Petrie!* Altitudinal range from 5000 to 6500 ft.

A very remarkable little plant, quite unlike any other.

3. **A. reniformis**, *Benth. and Hook. f. l.c.* — Bright-green, rather fleshy, perfectly glabrous. Rhizome slender, creeping, often emitting short stolons. Leaves tufted, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., orbicular or reniform, crenate-lobed, coriaceous or almost membranous; petioles rather stout, 1–2 in. long, sheathing at the base; stipules acute or acuminate, quite entire. Umbels 3–8-flowered, on rather stout peduncles much shorter than the leaves; involucral bracts linear, obtuse, membranous. Fruit $\frac{1}{8}$ in. long, linear-oblong, tetragonous, rather longer than its pedicel; carpels obscurely 5-ribbed.—*Kirk, Students' Fl.* 191. *Pozoa reniformis*, *Hook. f. Fl. Antarct.* i. 15, t. 11; *Handb. N.Z. Fl.* 88.

AUCKLAND AND CAMPBELL ISLANDS: *Hooker, Kirk!* December–January.

4. **A. Haastii**, *Benth. and Hook. f. l.c.*—Exceedingly variable in size, 1–10 in. high. Rhizome stout, branched, with tufts of radical leaves at the tips, often with prostrate or ascending leafy and flowering branches. Leaves $\frac{1}{3}$ –2 in. diam., reniform or orbicular with usually an open sinus, glabrous or sparingly setose, coriaceous or almost fleshy, bright-green and glossy, crenate-lobed; lobes broad, shallow, rounded; margins thickened, almost cartilaginous; petioles variable in length, $\frac{1}{2}$ –8 in.; stipules broad, usually more or less ciliate at the tips. Umbels peduncled, many-flowered, often 1–3 secondary ones arising from the base of the primary one and far exceeding it; floral leaves cuneate, 3–4-toothed or -lobed; involucre bracts linear-oblong, obtuse. Pedicels usually much longer than the oblong tetragonous fruit; carpels obscurely 5-ribbed.—*Kirk, Students' Fl.* 192. *Pozoa Haastii*, *Hook. f. Handb. N.Z. Fl.* 88. *Pozoa elegans*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 386.

NORTH ISLAND: Ruahine Mountains, *A. Hamilton*! SOUTH ISLAND: Not uncommon in mountain districts from Nelson to Otago, altitude 2000–5000 ft. December–February.

This varies much in most of its characters, and as a species is doubtfully distinct from *A. reniformis*. Ordinarily, however, it can be separated from that plant by the ciliate stipules, many-flowered umbels, and long fruiting pedicels. But the stipules are sometimes entire, and dwarf specimens frequently have short pedicels. Mr. Colenso's *Pozoa elegans* (as proved by the type specimens in his herbarium, labelled in his own handwriting) is founded upon the tips of the flowering shoots of *A. Haastii*. He describes the leaves as "2–3-foliolate," having evidently mistaken the approximate floral leaves for parts of a compound leaf.

5. **A. Roughii**, *Benth. and Hook. f. l.c.*—Perfectly glabrous, smooth and shining. Rhizome stout, branched, terminated by numerous radical leaves, and usually with prostrate or ascending leafy flowering branches. Leaves $\frac{1}{2}$ –1½ in. diam., orbicular or reniform, coriaceous, 3–5-foliolate or -partite; leaflets sessile, broadly obcuneate, deeply crenate-toothed or lobed at the tip; lobes rounded; petioles 1–6 in. long; stipules usually laciniate. Flowering shoots often exceeding the leaves; umbels many-flowered, usually 1–3 secondary ones arising from the base of the primary and overtopping it; involucre bracts linear-oblong, obtuse. Pedicels usually longer than the linear-oblong fruit; carpels rounded at the back, 5-ribbed.—*Kirk, Students' Fl.* 192. *Pozoa Roughii*, *Hook. f. Handb. N.Z. Fl.* 89.

SOUTH ISLAND: Mountains of Nelson and Marlborough, from Dun Mountain to the Upper Clarence and Waiau, not uncommon. 2500–5000 ft. December–February.

This has the same habit as *A. Haastii*, but can always be recognised by the divided leaves. I have seen no specimens from the south of Lake Tennyson and the Upper Waiau.

6. **A. hydrocotylodes**, *Benth. and Hook. f. l.c.*—Perfectly glabrous, stout, often densely matted. Root long and woody. Stems creeping and rooting at the nodes and putting up tufts of leaves, the runners sometimes 6 in. long or more. Leaves numerous, crowded, $\frac{1}{4}$ – $\frac{2}{3}$ in. diam., orbicular or orbicular-reniform, very thick and coriaceous, 3–5-foliolate or -partite; leaflets sessile, sometimes overlapping, broadly obovate-cuneate, bluntly 3–5-lobed or -crenate at the tip; margins thickened; petioles stout, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; stipules narrow, entire or ciliate. Peduncles variable in length, solitary from the nodes of the stem or 2–4 at the top of a leaf-bearing scion. Umbels 4–15-flowered; involucre bracts linear, obtuse. Fruit linear-oblong, tetragonous, usually shorter than the pedicel; carpels 5-ribbed.—*Kirk, Students' Fl.* 192. *Pozoa hydrocotylodes*, *Hook. f. Handb. N.Z. Fl.* 88.

SOUTH ISLAND: Canterbury—Mount Torlesse, *Enys!* *Kirk!* *T. F. C.*; Kowai River, *Haast*; Broken River, *Enys!* *T. F. C.*; Rangitata, *Sinclair*. Otago—Kurow Mountains and Mount St. Bathans, *Petrie!* 2000–4500 ft. December–February.

The creeping stems and excessively coriaceous leaves are the best marks of this curious little plant.

7. **A. pallida**, *T. Kirk, Students' Fl.* 193. —Pale-green, perfectly glabrous, smooth and shining. Rhizome creeping, leafy at the joints, and emitting creeping stolons. Leaves numerous, crowded, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., orbicular or reniform, usually flaccid and membranous, rarely subcoriaceous, 3-foliolate or rarely 3-partite; leaflets obcuneate, 3–6-lobed at the tips; petioles slender, 1–3 in. long; stipules lacinate. Peduncles usually shorter than the leaves, either bearing a single terminal umbel with a 3–4-lobed leaf at its base, or with 2–3 long-stalked secondary umbels springing from the base of the primary one; sometimes the secondary umbels develop 1–2 tertiary ones in like manner. Umbels 4–12-flowered; involucre leaves linear, obtuse. Pedicels longer than the linear-oblong obtusely 4-angled fruits; carpels 5-ribbed.—*Pozoa pallida*, *Kirk in Trans. N.Z. Inst.* x. (1878) 419.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.*; Lake Rotoiti and Upper Wairau Valley, *Kirk!* *T. F. C.*; Lake Guyon, *Kirk!* Canterbury—Pukunui Creek, *Kirk!* Mount Torlesse, *Petrie!* Broken River, *Enys* and *T. F. C.* 1200–4000 ft. December–February.

8. **A. nitens**, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 270.—Small, slender, perfectly glabrous, smooth and shining, densely matted. Rhizomes creeping, much branched and interlaced. Leaves few, minute, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., 3-foliolate or 3-partite; leaflets sessile or shortly stalked, oblong-ovate to linear-obovate, obtuse or acute, entire or obscurely 2–3-toothed, rather thin, perfectly glabrous; petioles slender, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long. Peduncles as long or longer than

the leaves, usually bearing a single terminal 2-3-flowered umbel with 1 or 2 3-lobed leaves below it, but often a secondary umbel is developed from the base of the primary one; involucreal leaves linear, acute. Fruits minute, $\frac{1}{15}$ in. long, obtusely tetragonous, rather turgid, about equalling the pedicels; capsules obscurely 5-ribbed.—*Kirk, Students' Fl.* 193.

SOUTH ISLAND: Nelson—Lake Guyon, *Kirk*! Canterbury—Broken River basin, *Enys*! *Kirk*! T. F. C. Otago—Lake Te Anau and Clinton Valley, *Petrie*. 700-3000 ft. December-January.

A very distinct little plant, in habit somewhat agreeing with small forms of *Hydrocotyle tripartita*.

9. *A. trifoliolata*, *Benth. and Hook. f. l.c.*—Very slender, with much of the habit and appearance of a *Hydrocotyle*. Stems filiform, branched, creeping and rooting at the nodes, 2-12 in. long. Leaves 2-6 at each node, membranous, glabrous or with a few scattered hairs, 3-foliolate; leaflets $\frac{1}{5}$ - $\frac{1}{2}$ in. long, shortly stalked or sessile, obovate-cuneate to flabellate, irregularly 2-6-lobed or -toothed; lobes obtuse or apiculate; petioles slender, 1-4 in. long; stipules small, ciliate. Peduncles much shorter than the leaves, usually 2-3 springing from the same point. Umbels 2-8-flowered; involucreal bracts subulate, ciliate or laciniate. Fruits obtusely tetragonous, longer than their pedicels; carpels rounded at the back, 5-ribbed.—*Kirk, Students' Fl.* 193. *Pozoa trifoliolata*, *Hook. f. Fl. Nov. Zel.* i. 85, t. 18; *Handb. N.Z. Fl.* 88. *P. microdonta*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 387.

NORTH AND SOUTH ISLANDS: Not uncommon from Hawke's Bay and Taranaki southwards. Sea-level to 2500 ft. November-February.

3. *ERYNGIUM*, Linn.

Perennial herbs. Leaves usually rigid and coriaceous, spinous-toothed, entire lobed or dissected. Flowers sessile in dense heads, with a bracteole under each flower, and a whorl of rigid often spinous-pointed bracts at the base of the head. Calyx-tube clothed with hyaline scales; teeth rigid, acute. Petals narrow, erect, deeply notched, with a long inflected point. Fruit ovoid or obovoid, scarcely compressed, covered with hyaline scales or tubercles; carpels semi-terete, primary ridges obscure, secondary wanting; vittæ inconspicuous or absent.

A large genus of over 150 species, spread through most temperate and sub-tropical regions, but most plentiful in South America and western Asia. The single species found in New Zealand extends to Australia as well.

1. *E. vesiculosum*, *Lab. Nov. Holl. Pl.* i. 73, t. 98.—A harsh and rigid spinous herb 2-9 in. high, with tufted radical leaves and prostrate stems much resembling stolons but not rooting. Radical leaves crowded, rosulate, 3-6 in. long, lanceolate or oblanceolate or spathulate-lanceolate, deeply toothed or almost pinnatifid, the teeth

involucral bracts numerous, ovate or lanceolate. Calyx-teeth obsolete. Petals oblong, acute, with a short incurved tip. Fruit oblong or linear-oblong, usually tapering to the apex, slightly compressed laterally; carpels subterete, with 5 equal obtuse ribs, the 2 lateral ones close to the commissure. Vittæ 1 in each furrow and 2 on the commissural face. Seed nearly terete, but grooved on the commissural side.

A genus of 5 or 6 species, all of which are natives of America, from Mexico to the Falkland Islands, one of them extending to Australia and New Zealand.

1. *O. andicola*, *Endl. Gen. Plant.* 787.—Exceedingly variable in stature and habit, 2–24 in. high, either stemless with radical leaves and scapes or much branched from the base, with short or long slender sparingly divided leafy stems, glabrescent or tomentose or pilose. Leaves usually numerous, mostly radical, 1–6 in. long, linear-oblong, pinnate or 2-pinnate; leaflets pinnatifid or variously toothed or incised. Peduncles several, usually springing from the rootstocks, but in the branched varieties axillary as well, longer or shorter than the leaves, glabrescent or pilose, especially towards the tip, where the hairs are usually reversed. Umbels few- or many-flowered; involucral bracts 6–8, ovate to linear. Flowers at first sessile, but pedicels lengthening as the fruit ripens, often unequally so. Fruit linear- or ovate-oblong, glabrous or more or less densely pubescent.—*Hook. f. Fl. Antarct.* ii. 288, t. 101; *Benth. Fl. Austral.* iii. 377; *Kirk, Students' Fl.* 197.

Var. *Colensoi*, *Kirk, l.c.* 198.—Leaves all radical, pinnate or 2-pinnate; leaflets pinnatifid or incised, ultimate segments acute. Scapes numerous, simple.—*O. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 92; *Handb. N.Z. Fl.* 91. *O. Haastii*, *Hook. f. l.c.*

Var. *rigida*, *Kirk, l.c.*—Stems stout, branched at the base only, 4–8 in. high. Leaves 2-pinnate, pubescent or tomentose; leaflets pinnatifid or deeply incised. Scapes stout and rigid, often depressed. Fruits linear.

Var. *ramosa*, *Kirk, l.c.*—Stems slender, much branched, often 2 ft. long. Leaves pinnate; leaflets membranous, distant, the lowest petioled, deeply 3–5-lobed or -partite or again pinnate, ultimate segments obtuse or subacute. Peduncles axillary, longer or shorter than the leaves, 3–8-flowered; pedicels unequal, sometimes 2 in. long. Fruits glabrous or pubescent.—*O. ramosa*, *Hook. f. Handb. N.Z. Fl.* 91. Mr. Kirk's var. *apiculata* appears to be a form of this.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant from the East Cape southwards. Sea-level to 4500 ft. November–February. Also in Australia and Tasmania and in South America.

I have followed Mr. Benthham and the "Index Kewensis" in uniting the three New Zealand species described by Hooker with the American and Australian *O. andicola*. Any large series of specimens will show that the development or non-development of a branched stem, and the amount of pubescence, which were the characters relied upon for the separation of the species, are in *Oreomyrrhis* far too variable and inconstant to be employed for that purpose.

7. CRANTZIA, Nutt.

A small creeping herb. Leaves linear, terete or compressed, undivided, transversely septate. Umbels simple, with minute involucre bracts. Flowers minute. Calyx-teeth small. Petals concave, acute, imbricate in the bud. Fruit ovoid-globose, slightly flattened laterally. Carpels nearly terete, with 5 ribs separated by furrows, the lateral ribs forming a thick and corky mass near the commissure. Vittæ 1 under each furrow and 2 at the commissure.

A monotypic genus, found in the United States and Mexico, extra-tropical and Andine South America, Australia and Tasmania, and New Zealand.

1. *C. lineata*, Nutt. *Gen. N. Amer. Pl.* i. 177.—Perfectly glabrous. Rhizome slender, creeping and rooting at the nodes, 2–6 in. long or more. Leaves usually tufted at the nodes, variable in size, $\frac{1}{2}$ –4 in. long, narrow-linear, fistulose, terete or sub-compressed, obtuse at the tip, transversely septate internally. Peduncles axillary, shorter than the leaves, filiform, bearing a single 2–8-flowered umbel. Flowers white. Fruit $\frac{1}{4}$ in. long.—*Hook. f. Fl. Antarct.* ii. 287, t. 100; *Fl. Nov. Zel.* i. 87; *Handb. N.Z. Fl.* 89; *Benth. Fl. Austral.* iii. 374; *Kirk, Students' Fl.* 199.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in wet places from the North Cape southwards. Sea-level to 2500 ft. November–February.

A very variable little plant. When completely submerged the leaves are fistulose and terete, softer in texture, and usually much larger; but when growing in places that are dry for a considerable part of the year the leaves are often much compressed and minute.

8. ACIPHYLLA, Forst.

Erect and rigid usually spinescent glabrous perennials, often of large size. Leaves thick and coriaceous, pinnate or 2–3-pinnate, the rachis transversely jointed at the insertion of the leaflets, leaf-segments usually ending in stout rigid spines. Umbels compound, in the axils of spinescent floral leaves or bracts, usually forming a more or less dense paniculate or spicate inflorescence; male umbels much more lax than the females. Flowers unisexual, usually dioecious. Calyx-teeth small or obsolete. Petals incurved, rarely with an inflexed tip. Stylopodia depressed in the male flowers, erect and conical in the female. Fruit oblong or linear-oblong; carpels with narrowly winged ridges, usually one 5-winged and the other 4-winged, or both 5-winged or 4-winged, or not rarely one carpel is 3-winged and the other 4-winged. Vittæ 1–3 under each furrow and 2–5 on the commissural face.

A genus confined to New Zealand, with the exception of 2 species found in the Australian Alps. It is mainly characterized by its remarkably distinct habit and spinescent leaves and bracts, the flowers and fruit being very similar to those of *Ligusticum*. Two of the species—*A. Colensoi* and *A. squarrosa*—often form almost impenetrable thickets in subalpine districts.

spinescent, narrowed into a broad flat petiole. Cauline leaves much smaller, opposite, cuneate or linear-cuneate, with fewer spinous teeth. Peduncles radical or from the nodes, $\frac{1}{2}$ –2 in. long, bearing a single globose or broadly ovoid head $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. Involucral bracts linear or lanceolate, rigid and spinous, spreading, far exceeding the flowers. Calyx-tube densely scaly.—*Hook. f. Fl. Nov. Zel.* i. 85; *Handb. N.Z. Fl.* 90; *Benth. Fl. Austral.* iii. 370.

NORTH AND SOUTH ISLANDS: On sandy beaches from the East Cape to the north of Otago, but often local. December–January. Also in Australia and Tasmania.

4. **ACTINOTUS**, Labill.

Annual or perennial herbs, erect and branching or low and densely tufted. Leaves toothed, lobed or ternately divided. Umbels simple, with an involucre of spreading bracts. Calyx-limb 5-toothed, rarely inconspicuous. Petals 5, unguiculate or spathulate or wanting. Ovary 1-celled, 1-ovuled; styles 2, often united at the base. Fruit ovate, of a single carpel, compressed from front to back; ribs 5, often obscure.

A small genus of about 10 species, confined to Australia and New Zealand. It is remarkable for the 1-celled ovary and single carpel of the fruit.

1. **A. novæ-zealandiæ**, *Petrie in Trans. N.Z. Inst.* xiii. (1881) 324.—Small, densely tufted. Stems creeping, interlaced and matted, forming flat compact patches. Branches villous or shaggy with soft white hairs. Leaves $\frac{1}{2}$ – $\frac{1}{6}$ in. long, oblong or oblong-spathulate, narrowed into a long sheathing petiole, quite entire, coriaceous and fleshy, glandular at the apex, glabrous or with a pencil of hairs at the tip. Peduncle $\frac{1}{4}$ – $\frac{3}{4}$ in. long, usually villous with soft spreading hairs, naked or with a single bract towards the top. Involucral bracts usually 5, broadly ovate or almost rounded, obtuse. Flowers 4–5. Calyx-limb apparently wanting. Petals absent. Stamens 2. Carpels somewhat compressed, convex on the outer face, obscurely ribbed.—*Kirk, Students' Fl.* 195. *A. bellidioides*, *Benth. Fl. Austral.* iii. 369 (*in part*). *Hemiphues suffocata*, *Hook. f. in Lond. Journ. Bot.* vi. (1847) 471. *H. bellidioides var. suffocata*, *Hook. f. Fl. Tasm.* i. 158, t. 36A.

SOUTH ISLAND: Nelson—Mountains near the Heaphy River, *Dall*! Mount Rochfort, *Rev. F. H. Spencer*! *W. Townson*! Otago—Blue Mountains, *Petrie*! Longwood Range, *Kirk*! STEWART ISLAND: Apparently not uncommon, *Petrie*! *Thomson*! *Kirk*! Sea-level to 3500 ft. Also in Tasmania.

5. **APIUM**, Linn.

Erect or prostrate glabrous herbs. Leaves ternately or pinately divided. Umbels compound, leaf-opposed or terminal. Involucral bracts usually wanting. Flowers white. Calyx-teeth obsolete. Petals ovate, concave, usually inflected at the tip. Fruit

ovate or broader than long, slightly compressed laterally, constricted at the commissure. Carpels ovoid, with five prominent obtuse nearly equal ribs. Vittæ 1 under each furrow and 2 on the commissural side.

A genus of about 15 species, widely dispersed in most parts of the world. In addition to the single indigenous species, two others have become naturalised in New Zealand—the wild celery (*A. graveolens*, Linn.), which is very closely allied to *A. prostratum*, differing chiefly in the erect habit and thinner ribs to the carpels; and *A. leptophyllum*, F. Muell., a common plant in many warm climates, and which can be recognised by the slender habit and ternately divided leaves with filiform segments.

1. **A. prostratum**, *Lab. Relat.* i. 141.—Very variable in size and degree of stoutness. Root sometimes as thick as the thumb. Stems prostrate or decumbent, more rarely suberect, sometimes rooting at the base, 6–24 in. long or more, stout or slender, branched, grooved, quite glabrous. Leaves excessively variable, 2–9 in. long, pinnate or 2-pinnate, sometimes trifoliate; leaflets sessile or petioled, 3-partite, the segments broad or narrow, coriaceous or membranous, incised or again deeply lobed. Umbels sessile or very shortly pendunculate; rays 3–15, $\frac{1}{2}$ –2 in. long, each bearing a secondary umbel of rather small white flowers on slender pedicels $\frac{1}{4}$ in. long. Involucral bracts wanting. Fruit broadly ovoid, $\frac{1}{12}$ – $\frac{1}{10}$ in. long; carpels with prominent almost corky ribs; vittæ not very conspicuous.—*Pl. Nov. Hoil.* i. 76, t. 103; *Kirk, Students' Fl.* 196. *A. australe*, *Thouars Fl. Trist. d'Acugn.* 43; *Hook. f. Fl. Nov. Zel.* i. 86; *Handb. N.Z. Fl.* 90; *Benth. Fl. Austral.* iii. 372. *Petroselinum prostratum*, *D.C. Prodr.* iv. 102; *A. Rich. Fl. Nouv. Zel.* 278; *A. Cunn. Precur.* n. 503.

Var. *a.*—Stems usually stout. Leaves pinnate; leaflets cut into numerous broad-obovate or obcuneate segments.

Var. *b.*—Stems usually stout. Leaves pinnate; leaflets cut into numerous narrow-linear or lanceolate acute segments.—*Petroselinum prostratum*, *D.C. var. b*, *Hook. Ic. Plant.* t. 305.

Var. *c*, **filiforme**.—Stems slender, prostrate. Leaves usually 3-foliate; leaflets petioled, variously lobed or cut.—*A. filiforme*, *Hook. Ic. Plant.* t. 819; *Hook. f. Fl. Nov. Zel.* i. 87; *Handb. N.Z. Fl.* 90. *Petroselinum filiforme*, *A. Rich. Fl. Nouv. Zel.* 278; *A. Cunn. Precur.* n. 504.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common throughout on the shores; the var. *filiforme* sometimes found inland as well. November–March. Also in Australia and Tasmania, Antarctic America, South Africa, and Tristan d'Acunha.

The extreme forms of this variable plant are very dissimilar, but are connected by numerous intermediates.

6. OREOMYRRHIS, Endl.

Perennial herbs, tufted or more rarely diffusely branched, glabrous pubescent or villous. Leaves pinnately divided or decompound. Umbels simple, solitary on a scape or peduncle;

involucral bracts numerous, ovate or lanceolate. Calyx-teeth obsolete. Petals oblong, acute, with a short incurved tip. Fruit oblong or linear-oblong, usually tapering to the apex, slightly compressed laterally; carpels subterete, with 5 equal obtuse ribs, the 2 lateral ones close to the commissure. Vittæ 1 in each furrow and 2 on the commissural face. Seed nearly terete, but grooved on the commissural side.

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Var. *ramosa*, *Kirk, l.c.*—Stems slender, much branched, often 2 ft. long. Leaves pinnate; leaflets membranous, distant, the lowest petioled, deeply 3–5-lobed or partite or again pinnate, ultimate segments obtuse or subacute. Peduncles axillary, longer or shorter than the leaves, 3–8-flowered; pedicels unequal, sometimes 2 in. long. Fruits glabrous or pubescent.—*O. ramosa*, *Hook. f. Handb. N.Z. Fl.* 91. Mr. Kirk's var. *apiculata* appears to be a form of this.

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A genus confined to New Zealand, with the exception of 2 species found in the Australian Alps. It is mainly characterized by its remarkably distinct habit and spinescent leaves and bracts, the flowers and fruit being very similar to those of *Ligusticum*. Two of the species—*A. Colensoi* and *A. squarrosa*—often form almost impenetrable thickets in subalpine districts.

A. Leaves rigid and coriaceous, pungent-pointed. Fruit small, $\frac{1}{10}$ – $\frac{1}{8}$ in., subterete or slightly compressed.

* Tall and stout, 2–5 ft. or more. Inflorescence a dense linear-oblong panicle, often several feet in length.

2–8 ft. high. Leaves 1–2-pinnate; leaflets broad, $\frac{1}{4}$ – $\frac{3}{4}$ in., excessively rigid and spinous. Middle lobe of bract not refracted 1. *A. Colensoi*.

2–6 ft. high. Leaves 2–3-pinnate; leaflets narrow, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad. Middle lobe of bract refracted 2. *A. squarrosa*.

1–3 ft. high. Leaves pinnate; leaflets $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, transversely jointed. Fruit narrow linear-oblong 3. *A. Traversii*.

** Small, 4–18 in. high, rarely more. Male inflorescence paniculate; female much contracted, almost concealed in the sheaths of the bracts.

4–12 in. high. Leaves 1–2-pinnate; leaflets almost squarrose, very short, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, flat, grooved above 4. *A. Hookeri*.

12–24 in. high, polished and shining. Leaves pinnate; leaflets 3–9 in. long, $\frac{1}{10}$ – $\frac{1}{4}$ in. broad 5. *A. Lyallii*.

10–16 in. high. Leaves trifoliolate; leaflets $1\frac{1}{2}$ –4 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad 6. *A. Hectorsii*.

3–7 in. high. Leaves trifoliolate or simple; leaflets 1–2 in. long, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad 7. *A. Traillii*.

6–12 in. high, excessively rigid and coriaceous. Leaves 4–9 in., simple or forked or 3-fid; segments $\frac{1}{4}$ – $\frac{1}{2}$ in. broad 8. *A. Kirkii*.

*** Small, 4–18 in. high. Both male and female inflorescence broad and paniculate.

Leaves coriaceous, pinnate or 2-pinnate at the base; leaflets $\frac{1}{12}$ – $\frac{1}{4}$ in. broad 9. *A. Monroi*.

Leaves firm but hardly coriaceous, 2–3-pinnate; leaflets $\frac{3}{10}$ – $\frac{1}{2}$ in. wide 10. *A. polita*.

**** Small, densely tufted, 3–4 in. high. Umbels few, terminal, forming a globose head.

Leaves densely imbricating, 3-fid 11. *A. Dobsoni*.

Leaves densely imbricating, quite entire 12. *A. simplex*.

B. Leaves flaccid. Fruit large, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, oblong, much compressed; carpels broadly 3- or 2-winged.

Stout, 2–3 ft. high. Leaves 3–4-pinnate. Inflorescence loosely paniculate 13. *A. Dieffenbachii*.

1. *A. Colensoi*, Hook. f. *Handb. N.Z. Fl.* 92. — Stem stout, erect, 2–5 ft. high, 2–3 in. diam. at the base, deeply grooved. Radical leaves numerous, forming a circle of bayonet-like spikes round the base of the stem, 1–2 $\frac{1}{2}$ ft. long, pinnate or 2-pinnate at the base, with few secondary leaflets; leaflets 5–15 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. wide or more, narrow-linear, acuminate, terminating in a long and stout spine, excessively thick and coriaceous, rigid, striate, margins rough with minute serrulations; sheaths broad, sometimes quite 2 in. across, very thick and coriaceous, produced on each side above into a spinous simple or forked narrow-linear leaflet 2–6 in. long. Inflorescence a narrow-oblong cylindrical panicle composed of numerous umbels on branched peduncles springing from the axils.

of spinous bracts; male inflorescence much more lax than the female. Bracts with broad sheaths and a 3-5-partite limb, the middle segment much the longest, not refracted. Flowers white; calyx-teeth obsolete. Fruit oblong, $\frac{1}{4}$ – $\frac{1}{3}$ in. long; carpels usually one 4-winged the other 3-winged, but sometimes both 4-winged or both 3-winged. Vittæ 2-4 in the interspaces and 5-6 on the commissural face.—*Lindsay, Contr. N.Z. Bot.* 49, t. 1; *Kirk, Students' Fl.* 207. *A. squarrosa* var. *b latifolia*, *Hook. f. Fl. Nov. Zel.* i. 88.

Var. **conspicua**, *Kirk, l.c.*—Leaf-segments not so rigid, with a broad orange or red midrib. Bracts bright-orange, often pinnately divided.

Var. **maxima**, *Kirk, l.c.*—Taller and stouter. Stem 4-10 ft. high, 2-4 in. diam. at the base. Leaves $1\frac{1}{2}$ -5 ft. long; segments $\frac{3}{4}$ in. broad or even more, still more rigid and pungent. Peduncles and pedicels longer. Fruit larger, $\frac{3}{4}$ in. long.

NORTH AND SOUTH ISLANDS: Common in mountain districts from the East Cape to Southland; most abundant between 1000-3000 ft., but ascending to nearly 5000 ft., and occasionally coming down to sea-level. Var. *conspicua*: North Island: Locality not stated, *Herb. Colenso*! Ruahine Mountains, *W. F. Howlett*! South Island: Wangapeka, *Kingsley*; Mount Murchison, *Townson*! Upper Waimakariri, *Cockayne*! *T. F. C.* Var. *maxima*: Mountain districts from Nelson to Otago, not uncommon. *Taramea*; *Spaniard*. December-January.

By far the finest species of the genus; easily distinguished from all others by the large size and broad leaf-segments. The two varieties described above have a very distinct appearance, but the differences are hardly of specific value.

2. **A. squarrosa**, *Forst. Char. Gen.* 136, t. 38.—Stem tall, stout, erect, 2-6 ft. high, 2-4 in. diam. below, deeply grooved, surrounded at the base by the numerous spreading spinous-pointed leaves. Radical leaves 1-3 ft. long, 2-3-pinnate; ultimate leaflets crowded, 6-12 in. long or more, very narrow-linear, $\frac{1}{6}$ – $\frac{1}{8}$ in. broad, coriaceous and rigid, deeply striate, gradually narrowed into rigid spinous points, margins rough with minute serrulations; sheaths broad, produced above on each side into a long pinnately divided spinous leaflet. Inflorescence a dense spike-like panicle composed of numerous umbels almost concealed in the axils of spinous bracts; female inflorescence much more contracted than the male. Bracts with a broad linear-oblong sheath tipped with 3-5 long rigid spines, the middle one much the longest and usually sharply refracted when the fruit is mature. Fruit oblong, $\frac{1}{4}$ – $\frac{1}{3}$ in. long; carpels usually one with 4 wings, the other with 3. Vittæ 2-3 in the interspaces and 4-6 on the commissural face.—*Hook. Ic. Plant.* t. 607, 608; *Hook. f. Fl. Nov. Zel.* i. 87; *Handb. N.Z. Fl.* 92. *Ligusticum aciphylla*, *Spreng. in Schultes Syst. Veg.* 554. *A. Rich. Fl. Nouv. Zel.* 274; *A. Cunn. Precur.* n. 505; *Raoul, Choix*, 46.

NORTH AND SOUTH ISLANDS: Abundant from the East Cape southwards, especially in mountain districts. Sea-level to 3500 ft. *Taramea*; *Kurikuri*; *Spear-grass*. November-January.

The very narrow leaflets and numerous bracts with long and narrow spinous segments, the middle one of which is sharply refracted, easily distinguish this from all the forms of *A. Colensoi*. Both species yield an aromatic gum resin, which was formerly used by the Maoris as a masticatory.

3. **A. Traversii**, *Hook. f. Handb. N.Z. Fl.* 729. — Stem stout, erect, 1–3 ft. high, 1–2 in. diameter at the base, grooved, purplish below. Radical leaves numerous, 6–30 in. long, pinnate; leaflets 2–4 pairs, 4–15 in. long, $\frac{1}{8}$ – $\frac{1}{2}$ in. broad, narrow-linear, pungent-pointed, coriaceous, striate, conspicuously transversely articulate, margins smooth or nearly so; petioles 4–10 in. long, sheaths broad, terminated by 2 short spines above. Bracts with a broad rather membranous sheath tipped with a simple or 3-fid leaflet; lobes hardly pungent. Umbels very numerous, solitary or two together in the axils of the bracts; males on peduncles 1–5 in. long, forming a rather open panicle; females on much shorter stalks and inflorescence much more dense. Flowers often polygamous. Fruit narrow linear-oblong, $\frac{2}{5}$ in. long; carpels one 4-winged and the other 3-winged. Vittæ 1–2 in the interspaces and 3–5 on the commissural face.—*Kirk, Students' Fl.* 208. *Gingidium Traversii*, *F. Muell. Veg. Chath. Is.* 18.

CHATHAM ISLANDS: *H. H. Travers, Captain G. Mair, F. A. D. Cox!*
Taramea. November–December.

Closely allied to *A. Colensoi*, from which it principally differs in the less rigid and transversely jointed leaf-segments, thinner and scarcely pungent bracts, and narrower fruit.

4. **A. Hookeri**, *T. Kirk, Students' Fl.* 209. — Erect, 4–12 in. high. Root long, stout, fusiform. Radical leaves numerous, often curved outwards at the tip, 2–8 in. long, pinnate or 2-pinnate; primary leaflets 2–5 pairs, crowded or rather remote, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, simple or forked or trifid or pinnately divided; segments $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear, spreading or squarrose, flat, grooved above, rigid and coriaceous, narrowed into a spinous point. Petiole more than half the length of the blade, weak and flaccid below, with a long narrow membranous sheath produced into two short spines at the top. Male scape short, leafy below; bracts numerous, with long membranous sheaths and pinnately divided rigid acicular tips, the lowest sometimes 3 in. long. Umbels numerous, compound, on slender peduncles equalling or shorter than the bract-sheath; rays unequal. Female umbels much smaller, densely packed, forming a narrow contracted panicle; bracts much shorter. Fruit linear-oblong, $\frac{1}{5}$ in. long; carpels 4–5-ribbed.

SOUTH ISLAND: Nelson—Mountains near the source of the Heaphy River, *Dall!* Mount Faraday and Mount Buckland (near Westport), *W. Townson!*
2500–4500 ft. December–February.

A very singular and distinct species. It can be recognised at once by the short flat almost squarrose leaf-segments.

5. **A. Lyallii**, *Hook. f. Handb. N.Z. Fl.* 92.—Erect, smooth and shining. Stems 1–2 ft. high or more, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam. at the base, deeply grooved. Leaves numerous, 4–12 in. long, pinnate; leaflets 5–9, 3–9 in. long, $\frac{1}{12}$ – $\frac{1}{5}$ in. broad, very narrow-linear, acuminate, gradually narrowed into spinous points, rigid and coriaceous, striate; margins minutely serrulate; sheaths rather narrow, produced at the top into two long spines. Inflorescence forming a linear-oblong spike-like panicle. Bracts with broad sheaths and 3–5 spinous leaflets. Male umbels on slender peduncles 1–3 in. long; female on much shorter peduncles, almost concealed in the sheaths of the bracts. Fruit narrow-oblong, $\frac{1}{2}$ in. long; carpels 4–5-winged. Vittæ 1–2 in the interspaces, 2–4 on the commissural face.—*Hemsl. in Hook. Ic. Plant. t.* 2556; *Kirk, Students' Fl.* 209. *A. montana*, *Armstr. in Trans. N.Z. Inst.* iv. (1872) 290.

Var. **crenulata**.—Rather taller, much less rigid and coriaceous. Leaves sometimes almost flaccid; margins serrulate; midrib often bright-red. Inflorescence more open, with longer and more leafy bracts. Carpels 4-winged, or one 3-winged.—*A. crenulata*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 336; *Kirk, Students' Fl.* 208.

SOUTH ISLAND: The typical form apparently rare. Rangitata Range and Ashburnham Glacier, *Haast*; Mount Ida, *Petrie*! *H. J. Matthews*! Humboldt Mountains, *Cockayne*! Var. *crenulata*: Not uncommon on the central and western slopes of the Southern Alps, from Mount Arthur, Nelson, to Lake Wanaka. 3000–5000 ft. December–January.

6. **A. Hectori**, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 346, t. 27.—Stem 10–16 in. high, stout, deeply grooved. Leaves numerous, 3–6 in. long, trifoliolate or rarely pinnate with 2 pairs of leaflets; leaflets $1\frac{1}{2}$ –4 in. long, $\frac{1}{6}$ – $\frac{1}{5}$ in. broad, narrow-linear, suddenly narrowed into a spinous point, smooth, rigid and coriaceous, striate; margins thickened, entire or serrulate; sheaths long, narrow, produced at the top into 2 very long leaflets almost equalling the leaves proper. Inflorescence forming a contracted spike-like panicle 2–5 in. long. Male umbels on slender peduncles; female on much shorter ones, crowded in the axils of the bracts. Bracts with long narrow sheaths and 3 narrow spinous leaflets. Carpels linear-oblong, 3–5-winged.

SOUTH ISLAND: Otago—Hector's Col, near Mount Aspiring, *Buchanan*; Mount Kyeburn, *H. J. Matthews*! 4000–5000 ft. January–February.

Mr. Kirk reduced this to *A. Lyallii* in the "Students' Flora," but it differs from that species in the trifoliolate leaves, and in the leaflets at the top of the leaf-sheath being almost as long as the leaves proper, whereas they do not reach the base of the lowest pinnule in *A. Lyallii*. It is much nearer to *A. Traillii*, which may be a depauperated state of it.

7. **A. Traillii**, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 371.—Small, 3–7 in. high, clothed below with the bases of the old leaves. Leaves 2–4 in. long, simple or 3-foliolate, or rarely pinnate with 2 pairs of leaflets and a terminal one; leaflets 1–3 in. long, $\frac{1}{12}$ – $\frac{1}{8}$ in.

broad, narrow-linear, pungent-pointed, rigid and coriaceous when dry, striate, margins thickened; petiole short, sheath narrow, rather membranous. Scape slender; bracts long, with broad membranous sheaths and a long simple or 3-partite pungent leaflet at the top. Male umbels distant or crowded, on short peduncles or almost sessile; females much smaller, concealed in the tumid sheaths of the bracts. Fruit linear-oblong, $\frac{1}{10}$ – $\frac{1}{8}$ in. long; carpels 5-ribbed. Vittæ 1 or rarely 2 in the interspaces, 2 or 4 on the commissural face.—*Students' Fl.* 210.

SOUTH ISLAND: Otago—Mount Ida and Mount Kyeburn, *Petrie!* STEWART ISLAND: Mounts Anglem and Rakiahua, *Kirk! Goyen!* 2000–3500 ft. December–January.

Not far removed from *A. Lyallii*, but smaller in all its parts, and with the leaves simple or 3-foliolate, rarely pinnate. Still more closely allied to *A. Hectori*.

8. **A. Kirkii**, *Buch. in Trans. N.Z. Inst.* xix. (1887) 214, t. 17.—Stout, erect, smooth and polished, 6–12 in. high. Leaves all radical, yellowish-brown, 4–9 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad or more, simple or forked or 3-foliolate, excessively thick and coriaceous, striate, suddenly narrowed into a short spinous point; sheath short and narrow, jointed at its junction with the blade. Flowering scape stout, naked below, grooved. Bracts coriaceous, spinous, simple or 2–3-partite. Male umbels shortly peduncled; females almost sessile in the axils of the bracts, crowded, forming a dense spicate inflorescence 2–3 in. long. Fruit linear-oblong, $\frac{1}{5}$ in. long; carpels 4–5-winged. Vittæ 1–2 in the interspaces, 4 on the commissural face.—*Kirk, Students' Fl.* 209.

SOUTH ISLAND: Otago—Mount Alta, *Buchanan!* Hector Mountains, hill near Mount Aspiring, *Petrie!* 5000–6000 ft. January.

A very remarkable plant, of which more complete specimens are required to draw up a good description. My only knowledge of the male flowers is derived from Mr. Buchanan's plate.

9. **A. Monroi**, *Hook. f. Fl. Nov. Zel.* ii. 330.—Stems 4–18 in. high, densely clothed below with the remains of the old leaves, smooth and shining. Radical leaves numerous, 3–9 in. long, pinnate or 2-pinnate below; leaflets 2–6 pairs, $\frac{1}{2}$ –2 in. long, $\frac{1}{12}$ – $\frac{1}{4}$ in. wide, linear, pungent, rigid and coriaceous, striate; sheaths long and narrow, membranous or flaccid, with two subulate leaflets at the top. Umbels compound, forming an open branched panicle $1\frac{1}{2}$ –4 in. long. Bracts spreading, sheaths often broad and membranous, tipped by a pinnately divided leaflet. Peduncles of the male umbels $\frac{1}{2}$ –2 in. long, females about half the length; rays numerous, slender, spreading; involucral bracts linear. Fruit $\frac{1}{6}$ in. long, linear-oblong; carpels 5-winged or rarely 4-winged. Vittæ 1–2 in the interspaces, 2–4 on the commissural face.—*Handb. N.Z. Fl.* 93; *Kirk, Students' Fl.* 210.

SOUTH ISLAND: Abundant in mountain districts throughout. 3000–6500 ft. December–January.

A variable plant. The leaves are sometimes uniformly 1-pinnate with rather broad leaflets, at other times 2-pinnate at the base with narrower leaflets. The female umbels are usually paniculate, but occasionally the panicle is somewhat contracted, showing an approach to that of *A. Lyallii*.

10. *A. polita*, *Cheesem.*—Stems erect, 3–12 in. high, clothed at the base with the sheaths of the old leaves. Radical leaves numerous, very slender, firm but hardly coriaceous, 2–6 in. long or more, 2–3-pinnate; primary divisions 4–6 pairs; ultimate segments very narrow-linear, almost capillary, not more than $\frac{1}{30}$ in. broad, mucronate but hardly pungent; petiole as long as the blade, sheath broad, membranous, produced at the tip into 2 almost filiform leaflets. Umbels compound, forming a loose open panicle, female slightly more contracted than the male. Bracts with a broad sheathing base, tipped with a pinnately divided leaflet. Male peduncles $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, female $\frac{1}{3}$ – $\frac{3}{4}$ in.; involucral bracts subulate-lanceolate. Pedicels short. Flowers white. Fruit narrow-oblong, not seen fully ripe, about $\frac{1}{8}$ in. long.—*Ligusticum politum*, *Kirk, Students' Fl.* 202.

SOUTH ISLAND: Nelson—Mount Duppa, *Macmahon*! Ben Nevis, Mount Starveall, and Mount Luna, *Gibbs, Bryant, Kingsley*; Mount Arthur Plateau and Mount Peel, *T. F. C.*; Mount Lockett, *Gibbs*! 4000–5500 ft. December–January.

Very closely allied to *A. Monroi*, but much more slender, and with less coriaceous almost membranous leaves, which are much more finely divided, the segments being sometimes nearly capillary. Mr. Kirk referred it to *Ligusticum* in the “*Students' Flora*,” but it must certainly remain in the neighbourhood of *A. Monroi*.

11. *A. Dobsoni*, *Hook. f. Handb. N.Z. Fl.* 93.—Stout, smooth and shining, forming compact yellowish-brown patches 3–6 in. diam. Rootstock thick and woody, branched at the top. Leaves all radical, very numerous, densely imbricated, excessively thick and coriaceous, $1\frac{1}{2}$ –3 in. long; sheaths $\frac{1}{2}$ – $1\frac{1}{2}$ in. or more, $\frac{3}{4}$ in. broad; leaflets 3 at the top of the sheath, about equal, 1–2 in. long, $\frac{1}{3}$ in. broad at the base, linear-subulate or dagger-shaped, rigid; concave, transversely jointed, keeled at the back towards the top, pungent-pointed. Flowering-stem very stout, almost as thick as the little finger, grooved. Umbels 4–5, clustered at the top of the stem, forming a capitate inflorescence; peduncles short, thick. Fruiting umbels densely packed, forming a rounded head 1 in. in diam. or more. Fruit linear-oblong, $\frac{1}{8}$ in. long; carpels 4–5-winged, but not seen quite ripe.—*Kirk, Students' Fl.* 210.

SOUTH ISLAND: On shingle-slopes, rare. Canterbury—Mount Dobson, *Dobson* and *Haast, T. F. C.*; mountains above Lake Ohau, *Buchanan*! Otago—Near Lake Hawea, *Haast*; Mount St. Bathans, *Petrie*! 5000–6500 ft.

A most remarkable plant, nowhere plentiful, and seldom seen in flower or fruit.

12. **A. simplex**, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 440.—Very similar to *A. Dobsoni*, and with precisely the same habit, but differing in the leaves, which are less coriaceous and quite entire, $1\frac{1}{2}$ –3 in. long; lower half expanded into a broad sheath; blade linear-subulate, rigid and coriaceous, concave above, obtusely rounded at the tip with a short pungent mucro, transversely jointed and often longitudinally grooved, midrib usually evident, margins thickened. Flowering-stem stout, $1\frac{1}{2}$ –3 in. long; umbels and flowers as in *A. Dobsoni*. Ripe fruit not seen.—*Kirk, Students' Fl.* 211.

SOUTH ISLAND: Otago—Mounts Pisa and Cardrona, and the Hector Mountains, *Petrie!* 5000–6000 ft. February.

13. **A. Dieffenbachii**, *Kirk, Students' Fl.* 211.—Stem stout, erect, 2–3 ft. high, $1-1\frac{1}{2}$ in. diam. at the base, grooved. Leaves all radical, 1–2 ft. long, 4–8 in. broad, flaccid, greyish-green, 3–4-pinnate; petiole usually more than half the length, sheath with two blunt lobes at the top; blade oblong or ovate-oblong in outline; primary pinnæ 4–5 pairs; segments $1\frac{1}{2}$ –3 in. long, $\frac{1}{10}$ in. broad, linear, flat, striate, mucronate. Inflorescence broad, loosely paniculate, of numerous pedunculate compound umbels. Bracts with a broad sheath and rather large pinnatisect lamina. Peduncles 2–5 in. long; rays of the male umbels numerous, slender, of the females about 6; involucre bracts few, linear-subulate. Fruit large, $\frac{5}{8}$ in. long, $\frac{3}{8}$ in. broad, broadly oblong, much dorsally compressed; carpels one 3-winged and the other 2-winged, rarely both 3-winged. Vittæ 1 in each interspace and 2 on the commissural face.—*Ligusticum Dieffenbachii*, *Hook. f. Handb. N.Z. Fl.* 729. *Gingidium Dieffenbachii*, *F. Muell. Veg. Chath. Is.* 17, t. 1.

CHATHAM ISLANDS: Rare, *H. H. Travers!* *F. A. D. Cox!*

The fruit of this is quite unlike that of *Aciphylla*, *Ligusticum*, or *Angelica*, to all of which genera it has been referred. Mr. Kirk is probably correct in considering that it will ultimately form the type of a new genus.

9. **LIGUSTICUM**, Linn.

Perennial herbs, often large and stout, usually with aromatic or strong-smelling foliage or roots. Leaves 1–2–3-pinnate or ternately divided; rhachis articulated at the insertion of the leaflets. Umbels compound, rarely simple, usually of many rays; involucre bracts few or many, sometimes wanting. Flowers white or red, polygamous or diœcious. Calyx-teeth small or obsolete. Petals incurved at the tip. Fruit linear-oblong, oblong, or ovate-oblong; carpels rounded or dorsally compressed, each with 5 equal narrowly winged ridges, or one carpel 5–4-winged, the other 4–3-winged. Vittæ usually numerous in the interspaces in the northern species, seldom more than 1 in each interspace in the southern.

A genus of from 30 to 40 species, widely distributed throughout the Northern Hemisphere, in the Southern Hemisphere confined to New Zealand, with the exception of a few species found in South America and one in Australia. All the New Zealand species are endemic.

A. Leaves 2-3-pinnate or decompose.

* Tall, stout, leafy, 2-4 ft. high or more.

- | | |
|--|---------------------------|
| Very tall and stout, 3-6 ft. Leaves 2-pinnate; leaflets ovate-oblong, decurrent at the base; lobes pungent .. | 1. <i>L. latifolium.</i> |
| Robust, 2-4 ft. Leaves 2-3-pinnate; ultimate segments linear-subulate, pungent | 2. <i>L. antipodum.</i> |
| Stems 3-5 ft., without milky juice. Leaves 3-pinnate; leaflets ovate; lobes acute; petioles with a hooded ligule | 3. <i>L. acutifolium.</i> |
| Stems 1-2 ft., with milky juice. Leaves 2-3-pinnate; leaflets ovate, cuneate at the base; lobes broad, obtuse; petioles without a ligule | 4. <i>L. intermedium.</i> |
| Stems 1½-2½ ft. Leaves 2-3-pinnate; leaflets oblong, cut into narrow obtuse lobes | 5. <i>L. Lyallii.</i> |
| Stems 1-2 ft. Leaves 2-4-pinnate; leaflets cut into narrow-linear piliferous lobes. Styles slender.. .. | 6. <i>L. Haastii.</i> |

** Small, 4-15 in. high, rarely taller.

- | | |
|--|---------------------------|
| Slender, 5-15 in. Leaves flaccid, 2-pinnate; leaflets cut into filiform hair-pointed lobes. Styles short .. | 7. <i>L. brevistyle.</i> |
| Stout, 5-15 in. Leaves coriaceous, 2-3-pinnate; leaflets cut into linear rigid and pungent lobes | 8. <i>L. dissectum.</i> |
| Very slender, 5-15 in. Leaves membranous, 2-3-ternately divided; leaflets few, flat, linear or filiform, acute .. | 9. <i>L. filifolium.</i> |
| Stout, 2-6 in. Leaves deltoid, membranous, 2-ternately divided; leaflets cuneate-deltoid, deeply incised .. | 10. <i>L. deltoideum.</i> |
| Stout, thick, and fleshy, 3-6 in. Leaves few, 2-3-ternately multifid. Involucral bracts like the leaves, very large, overtopping the umbel | 11. <i>L. carnosulum.</i> |
| Slender, spreading, 6-12 in. Leaves 1-2-pinnate; leaflets distant, cut into narrow-linear acute lobes. Umbels simple, 6-10-flowered | 12. <i>L. patulum.</i> |

B. Leaves pinnate or 3-foliolate.

- | | |
|--|----------------------------|
| Stout, 8-24 in. Leaflets large, ovate-deltoid, toothed or lobed; lobes piliferous | 13. <i>L. piliferum.</i> |
| Slender, 2-12 in. Leaflets small, orbicular or flabellate, toothed or incised | 14. <i>L. aromaticum.</i> |
| Small, densely tufted, 1-3 in. Leaves imbricate; leaflets palmately 3-6-lobed, bristle-pointed | 15. <i>L. imbricatum.</i> |
| Stout, depressed, 3-4 in. Leaflets glaucous, ovate, sharply toothed or lobed | 16. <i>L. Enysii.</i> |
| Minute, ½-2 in. Leaflets 1-2 pairs, flabellate, entire or obscurely crenate | 17. <i>L. flabellatum.</i> |

1. *L. latifolium*, Hook. f. *Handb. N.Z. Fl.* 94.—Tall, stout, erect, coriaceous, 3-6 ft. high or more. Stem frequently 3-4 in. diam. at the base, grooved. Radical leaves 1-2 ft. long, coriaceous, deep shining green; petioles long, $\frac{3}{4}$ -1 in. diam., broadly sheathing at the base; blade ovate in outline, 2-pinnate; primary divisions 2-6 in. long, linear-oblong; secondary obliquely ovate-oblong with

broad decurrent bases, unequally 3-5-lobed; lobes acuminate, with acicular points and thickened margins; veins reticulate. Bracts very large, with broad concave bases 2-3 in. diam., and smaller foliaceous tips. Umbels numerous, compound, 2-3 in. diam., diœcious or polygamous; involucrel bracts linear, acute. Flowers red. Fruit $\frac{1}{2}$ in. long; carpels with 5 ridges, rarely with 4 or 3; vittæ solitary under each furrow.—*Kirk, Students' Fl.* 200. *Anisotome latifolia*, *Hook. Fl. Antarct.* i. 16, t. 8. *Calosciadium latifolium*, *Endl. ex Walp. Ann.* ii. 702.

Var. **angustatum**, *Kirk, l.c.*—Ultimate segments of the leaves narrower, $\frac{1}{4}$ in. wide or less, acicular points longer.

AUCKLAND AND CAMPBELL ISLANDS: Abundant in moist places throughout the group. December-January.

A noble species, said to occasionally reach the height of 6-8 ft.

2. **L. antipodum**, *Homb. and Jacq. ex Dcne. Bot. Voy. Astrol. et Zél.* 63, t. 3.—Stems 2-4 ft. high, very stout, deeply furrowed. Leaves 1-2 ft. long, coriaceous; petiole as thick as the thumb, sheathing at the base; blade oblong, 2-3 pinnate; ultimate segments very numerous, rigid, crowded, 1 in. long, $\frac{1}{15}$ - $\frac{1}{12}$ in. broad, linear-subulate, pungent-pointed. Bracts smaller and narrower than in *L. latifolium*. Umbels numerous, compound, 2 in. diam., diœcious or polygamous; involucrel bracts narrow-linear. Flowers red. Fruit $\frac{1}{4}$ in. long, narrow-oblong; carpels one with 5 wings, the other 3-winged.—*Hook. f. Handb. N.Z. Fl.* 94; *Kirk, Students' Fl.* 200. *Anisotome antipoda*, *Hook. f. Fl. Antarct.* i. 17, t. 9, 10. *Calosciadium antipodum*, *Endl. ex Walp. Ann.* ii. 702.

AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant throughout the group, *Sir J. D. Hooker, Kirk!* December-January.

Almost as fine a plant as the preceding, which is its nearest ally, and from which it is easily separated by the finely divided leave with numerous linear segments.

3. **L. acutifolium**, *T. Kirk in Journ. Bot.* (1891) 237.—Stems 3-5 ft. high, stout, deeply furrowed; rootstock as thick as the wrist. Leaves spreading, 2 ft. long or more, 6-9 in. broad, oblong or ovate-oblong, 3-pinnate; segments broad, acute, sharply toothed; petiole stout, finely grooved, the upper part of the sheath free, forming a ligule. Flowers not seen. Fruiting umbels 2-2 $\frac{1}{2}$ in. diam., dense, compound; rays numerous, about 1 in. long. Fruit $\frac{1}{2}$ in. long, exceeding the pedicels; carpels one 5-winged, the other 3-winged.—*Kirk, Students' Fl.* 201.

THE SNARES: Not uncommon, *Kirk!* December.

My knowledge of this plant is derived from a single imperfect specimen in Mr. Kirk's herbarium, and in default of further information I have reproduced the description given in the "Students' Flora." It is evidently very close to *L. intermedium*, but according to Kirk can be distinguished by the ligulate petiole, acute segments of the leaves, smaller umbels and shorter fruits, and by the absence of viscid milky juice.

4. **L. intermedium**, *Hook. f. Handb. N.Z. Fl.* 94.—Stems rather stout, 6–24 in. high, abounding in viscid milky juice. Leaves 6–20 in. long; petiole long, stout, sheathing at the base, with narrow membranous wings; blade coriaceous, oblong to ovate-oblong, 2–3-pinnate; primary divisions 5–8 pairs, 2–4 in. long; leaflets $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, rather broad, ovate-triangular, cuneate at the base, sessile or shortly stalked, unequally cut to the middle or below it into broad-linear obtuse or subacute lobes. Umbels few or many, $1\frac{1}{2}$ –2 in. diam., compound, polygamous or diœcious; involucre bracts linear-lanceolate. Flowers white. Fruit $\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear-oblong; carpels with 5 narrow wings, or one with 5 and the other with 4 wings.—*Kirk, Students' Fl.* 201. Anisotome *intermedia*, *Hook. f. Fl. Nov. Zel.* i. 89.

Var. **oblongifolium**, *Kirk, l.c.*—Leaves narrower, linear-oblong, seldom more than 2 in. broad; segments more numerous, crowded, narrow-linear, subacute.

SOUTH ISLAND: Sounds of the south-west coast of Otago, from Martin's Bay to Preservation Inlet and Puysegur Point, *Lyall, Buchanan! Kirk! G. M. Thomson!* South-east coast at Catlin's River and the Nuggets, *Petrie!* STEWART ISLAND: Not uncommon, *Petrie! Kirk!* Var. *oblongifolium*: Inland base of the Ruggedy Range, *Kirk!* December–January.

5. **L. Lyallii**, *Hook. f. Handb. N.Z. Fl.* 95.—Usually taller and stouter than *L. intermedium*. Stem $1\frac{1}{2}$ – $2\frac{1}{2}$ ft. high, 1–2 in. diam. at the base, purplish, obscurely grooved. Leaves 1–2 ft. long, linear-oblong, 2–3-pinnate; primary divisions 6–10 pairs, 1–4 in. long, linear-oblong; leaflets crowded, 1 in. long, oblong-cuneate, cut to the base into linear obtuse lobes $\frac{1}{2}$ in. broad. Umbels numerous at the top of the stem, compound, many-flowered; involucre bracts linear. Fruit $\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear-oblong, longer than its pedicel; carpels much as in *L. intermedium*.—*Kirk, Students' Fl.* 201. Anisotome *Lyallii*, *Hook. f. Fl. Nov. Zel.* i. 88.

SOUTH ISLAND: Sounds of the south-west coast, *Lyall, Hector and Buchanan! G. M. Thomson!* December–January.

This only differs from *L. intermedium* in the slightly larger size and more finely divided leaves, and might well be regarded as a variety.

6. **L. Haastii**, *F. Muell. ex Hook. f. Handb. N.Z. Fl.* 95.—Dark-green, very aromatic. Root stout, tapering, as thick as the finger. Stems 1–2 ft. high, rather stout, purplish, grooved. Radical leaves 6–20 in. long; petioles long, grooved, sheathing at the base; blade linear-oblong to ovate-oblong, membranous, 2–4-pinnate; primary divisions 8–12 pairs, the lower smaller and remote; leaflets $\frac{1}{2}$ – $\frac{3}{4}$ in. long, deeply cut into numerous crowded linear lobes $\frac{1}{4}$ – $\frac{1}{2}$ in. long, $\frac{1}{30}$ – $\frac{1}{25}$ in. wide, with short or long hair-like points. Cauline leaves or bracts much smaller, with very broad inflated sheathing petioles. Umbels diœcious, usually numerous,

1-2 in. diam., compound, the lower ones on long peduncles, forming a terminal open panicle; involucreal leaves linear-subulate, shorter than the rays. Flowers white. Fruit ovoid-oblong, $\frac{1}{5}$ - $\frac{1}{4}$ in. long; carpels 5-winged.—*Kirk, Students' Fl.* 201.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to Southland, especially within the influence of the western rainfall. 1500 ft. to nearly 5000 ft. December-January.

A handsome and graceful plant, easily recognised by the finely divided membranous leaves with hair-pointed lobes. Mr. Petrie sends a variety from Mount Tyndall with the lobes almost capillary, with much longer hair-points.

7. **L. brevistyle**, *Hook. f. Handb. N.Z. Fl.* 95.—Stems 6-18 in. high, slender, grooved. Radical leaves 4-12 in. long; petiole somewhat rigid, shortly sheathing at the base; limb linear-oblong in outline, rarely broader and ovate-oblong, 2-3-pinnate; primary divisions 6-10 pairs; leaflets cut down to the rhachis into 3-5 distant very narrow-linear lobes $\frac{1}{4}$ - $\frac{3}{4}$ in. long with short acicular tips. Umbels few, 1-8, loosely panicked, compound, dicæious; involucreal bracts filiform, shorter than the rays. Fruit on very short pedicels, oblong, $\frac{1}{8}$ - $\frac{1}{6}$ in. long; carpels with 5 narrow wings; styles very short.—*Kirk, Students' Fl.* 202.

SOUTH ISLAND: Canterbury—Upper Waitaki and head of Lake Hawea, Haast! Otago—Lake district, Hector and Buchanan! Kurow, Mount Ida, Cromwell, and other localities in eastern and central Otago, Petrie! 800-3500 ft. December-January.

Closely related to *L. Haastii*, but a much smaller and more slender plant, with more sparingly divided leaves, smaller fruit, and shorter styles.

8. **L. dissectum**, *T. Kirk, Students' Fl.* 202.—Rather stout, coriaceous, 5-15 in. high. Rootstock thick, covered with the ragged bases of the old leaves. Radical leaves 3-12 in. long, coriaceous but hardly rigid; petiole half the length or more, with a long and narrow sheath; blade ovate-oblong or ovate-lanceolate, 2-3-pinnate; primary pinnae 4-9 pairs, 1-2 in. long; secondary closely placed, ternately or pinnately cut into numerous linear pungent-pointed segments $\frac{1}{4}$ -1 in. long and about $\frac{1}{20}$ in. wide. Umbels compound, few or many in an open branched panicle; primary rays numerous, 10-20; involucreal bracts linear or lanceolate, acuminate. Fruit linear-oblong, $\frac{1}{8}$ in. long; carpels 5-winged.

NORTH ISLAND: Mount Holdsworth and other high peaks of the Tararua Range, Buchanan! T. P. Arnold! W. Townson! December-February.

An imperfectly known species, perhaps more nearly allied to *L. piliferum* than to any other, but differing widely in the much more divided leaves.

9. **L. filifolium**, *Hook. f. Handb. N.Z. Fl.* 95.—Slender, grassy, very aromatic. Stems 6-20 in. high, smooth, striate, often much branched above. Leaves 4-15 in. long, thin and often flaccid; petioles very long, slender, sheathing at the base, sheaths short and broad, membranous; blade very variable in size and shape, ter-

nately divided into narrow-linear flat acute segments $\frac{1}{2}$ – $1\frac{1}{2}$ in. long and varying in width from filiform to $\frac{1}{3}$ in., the broadest sometimes toothed or lobed at the tip. Umbels few, compound, diœcious, on long slender peduncles; rays slender, very unequal, $\frac{1}{2}$ –2 in. long; involucral bracts few, short, subulate-lanceolate. Fruit $\frac{1}{3}$ in. long, linear-oblong, compressed; carpels thin, 5-winged, lateral wings broader than the dorsal.—*Kirk, Students' Fl.* 203.

SOUTH ISLAND: Mountain districts from Cook Strait to the south of Canterbury, not uncommon. 1000–4500 ft. December–January.

10. *L. deltoideum*, *Cheesem. in Trans. N.Z. Inst.* xiv. (1882) 299.—Small, stout, dark-green and shining, very aromatic, 2–6 in. high. Rootstock stout, clothed with pale chaffy scales. Leaves numerous, all radical, membranous, 2–4 in. long; petiole half the length, sheathing at the base; blade broadly deltoid in outline, ternately or 2-pinnately divided; leaflets $\frac{1}{5}$ – $\frac{1}{3}$ in. long, cuneate-deltoid, deeply 3–5-lobed; lobes flat, very narrow linear-subulate, acute or acuminate. Flowering-stems short, seldom exceeding the leaves. Umbels small, $\frac{1}{2}$ –1 in. diam., compound; rays 4–8, slender, very unequal; involucral bracts short, linear-subulate. Flowers white or pink. Ripe fruit not seen.—*Kirk, Students' Fl.* 203.

SOUTH ISLAND: Grassy slopes on Mount Arthur, Nelson, altitude 4000–5500 ft., *T. F. C.*; Mount Stokes, Marlborough, *Macmahon!* December–January.

Close to *L. filifolium*. but distinguished by the smaller size, more numerous leaves with copious divisions, differently shaped leaflets, and short flowering stems, which rarely exceed the leaves.

11. *L. carnosulum*, *Hook. f. Handb. N.Z. Fl.* 96. — Small, 3–6 in. high, thick and fleshy, glaucous-green. Root stout, often as thick as the little finger, tortuous among shingle. Stems usually short, tapering downwards. Leaves 1–3 near the top of the stem or from the root, very thick and fleshy; petiole $\frac{1}{2}$ –2 in. long, with a short broad sheath; blade 1–3 in. diam., 2–3-ternately multifid, ultimate segments $\frac{1}{4}$ – $\frac{2}{3}$ in. long, $\frac{1}{15}$ – $\frac{1}{10}$ in. broad, very narrow linear, acute or subacute, curved, obscurely jointed on the rhachis. Umbel solitary, compound, large for the size of the plant, $1\frac{1}{2}$ –4 in. diam.; involucral bracts about 5, 2–3-ternately divided like the leaves, overtopping the umbel; rays numerous, rigid, almost woody in fruit, $\frac{1}{2}$ –1 in. long. Secondary umbels small, concealed among the bracts of the involucels, which far exceed the small white or pink almost sessile flowers. Calyx-teeth acute, prominent. Styles rigid, subulate. Fruit oblong, $\frac{1}{4}$ in. long; carpels incurved, with 5 low obtuse ridges, commissural face rounded; vittæ 1 under each furrow and 2 on the commissure.—*Kirk, Students' Fl.* 203.

SOUTH ISLAND: Bare shinge-slopes on the mountains of Nelson and Canterbury, not common. Wairau Gorge, *T. F. C.*; Mount Captain, *Kirk!* Lake

Tennyson, *T. F. C.*; Mount Torlesse, *Haast!* Petrie! *T. F. C.*; mountains by the upper and middle Waimakariri, *Enys!* Petrie! Cockayne! 3000–6000 ft. December–February.

A very remarkable plant, which cannot be confounded with any other found in New Zealand.

12. ***L. patulum***, *T. Kirk, Students' Fl.* 203.—Slender, greyish-green, 6–12 in. high or more. Stems erect or inclined, branched above, grooved. Radical leaves 2–6 in. long, linear-oblong in outline, pinnate or rarely 2-pinnate; leaflets 4–7 pairs, cut down to the rhachis into narrow-linear acute lobes, which are again toothed or incised at the tips, rarely entire. Cauline leaves smaller, with fewer leaflets and narrower lobes. Umbels small, simple in the very imperfect specimens seen, on slender peduncles, 6–12-flowered; involucrel bracts linear, with a broad base, usually shorter than the unequal pedicels. Ripe fruit not seen.

SOUTH ISLAND: Canterbury—Limestone cliffs near Burke's Pass, *J. B. Armstrong!* Otago (?) *Buchanan!*

There is a fragmentary specimen of this species in Mr. Kirk's herbarium, and another (without locality) in Mr. Buchanan's. The material is far too incomplete to form the basis of a satisfactory diagnosis; and that given above will doubtless require amendment when a good series of specimens is obtained.

13. ***L. piliferum***, *Hook. f. Handb. N.Z. Fl.* 96.—Stout, erect, glaucous-green, very aromatic. Root thick and tapering. Stem 8–24 in. high or more, sparingly branched above, smooth, striate, purplish below. Leaves 4–16 in. long, very thick and coriaceous; petioles stout, sheathing, sheath long and narrow; blade linear or linear-oblong, pinnate; leaflets 8–12 pairs, $\frac{1}{2}$ –1 in. long, sessile, closely placed and often overlapping, deltoid-ovate or deltoid-orbicular, coarsely toothed or 2–3-lobed or pinnatifid; lobes or segments again toothed, tipped with a stout bristle. Umbels 2–4, on stout peduncles towards the top of the stem, 2–3 in. diam., compound, diœcious; rays $\frac{3}{4}$ –1 $\frac{1}{2}$ in. long, unequal; involucrel bracts linear or lanceolate. Flowers white, rather small. Fruit $\frac{1}{6}$ in. long, ovate-oblong; carpels usually 3-winged.—*Kirk, Students' Fl.* 204.

Var. *a.*—Leaflets broad, very coriaceous, usually deeply 3-lobed; the lobes broad, toothed.

Var. *b.* ***pinnatifidum***, *Kirk, l.c.*—Leaflets longer and narrower, not so coriaceous, pinnatifidly cut into narrower lobes.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to the west of Otago. 2500–4500 ft. December–January.

14. ***L. aromaticum***, *Hook. f. Handb. N.Z. Fl.* 96.—Very aromatic, variable in size and habit, usually from 4–12 in. high, but in alpine situations often much dwarfed, matted and depressed, sometimes barely 2 in. high. Root stout, often long and tapering. Stem simple or sparingly branched above. Leaves all radical,

numerous, 1–6 in. long, coriaceous or almost membranous; petiole short, stout, broadly sheathing at the base; blade linear, pinnate; leaflets 6–12 pairs, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, deltoid-ovate or orbicular or broadly flabellate, more or less toothed or incised, sometimes pinnatifid or even again pinnate; lobes and teeth usually ending in a short or long bristle-like point. Umbels small, dioecious, compound, $\frac{1}{2}$ – $1\frac{1}{2}$ in. diam.; males usually longer and more open than the females; rays slender, unequal, $\frac{1}{2}$ –2 in. long; involucre bracts few, small, linear-subulate. Fruit linear-oblong, $\frac{1}{8}$ in. long; carpels 5-winged.—*Kirk, Students' Fl.* 204. *Anisotome aromatica*, *Hook. f. Fl. Nov. Zel.* i. 89.

Var. *incisum*, *Kirk, l.c.*—Larger and more membranous, 12–20 in. high. Leaflets flabellate or rhomboid, 3-partite almost to the base; segments deeply incised, spreading.

Var. *lanuginosum*, *Kirk, l.c.*—Leaf-segments tipped with copious long snow-white hairs, sometimes almost concealing the leaves.

NORTH AND SOUTH ISLANDS: Abundant in mountain districts from the East Cape to Foveaux Strait. Altitudinal range 1500–6500 ft. November–February. Var. *incisum*: Broken River, Canterbury, *Kirk*! Var. *lanuginosum*: Mountains above Lake Tekapo, *T. F. C.*; Hector Mountains, Mount Pisa, Mount Cardrona, and other localities in Central Otago, *Petrie*!

15. *L. imbricatum*, *Hook. f. Handb. N.Z. Fl.* 97. — Small, much branched, densely tufted, forming large flat or convex patches. Stems stout, 1–3 in. long, densely clothed with numerous closely imbricating coriaceous shining leaves. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in. long; petioles very short, with large broad membranous sheaths produced upwards into a hooded ligule; blade with a broad flattened rhachis and 4–8 pairs of closely placed often imbricating leaflets; leaflets sessile, palmately 3–6-lobed; lobes terminated by a stout bristle longer than the lobes. Umbels small, simple or compound, sunk among the leaves; involucre bracts few, linear-subulate. Fruit broadly ovoid; carpels 5-winged.—*Kirk, Students' Fl.* 205.

SOUTH ISLAND: High peaks from Nelson and Marlborough to Southland, not uncommon. 4000–6500 ft. January–February.

A very remarkable little plant, easily known by its small size, densely tufted habit, imbricated leaves, short peduncles sunk among the leaves, and broad fruit.

16. *L. Enysii*, *T. Kirk in Trans. N.Z. Inst.* ix (1877) 548.— Small, stout, depressed, glaucous-green, seldom more than 4 in. high. Root stout, often very long. Leaves all radical, $1\frac{1}{2}$ –3 in. long, spreading or decurved, thick and coriaceous when fresh, linear or linear-oblong, pinnate; leaflets 3–6 pairs, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, sessile, ovate or ovate-orbicular, sharply toothed or lobed; lobes again cut, not piliferous; petioles with very broad short sheaths. Flowering-stems 2–4 in. long, simple or forked, decumbent. Umbels

compound; rays 2-5, slender, spreading, unequal, $\frac{1}{4}$ - $\frac{3}{4}$ in. long; bracts 2-3, connate almost to the tips into a broad cup-shaped involucre. Partial umbels 3-6-flowered. Fruit ovoid, $\frac{1}{8}$ in. long; carpels with 5 obscure ridges.—*Students' Fl.* 205.

SOUTH ISLAND: Canterbury—Limestone shingle in the Broken River basin, *Enys!* *Kirk!* T. F. C. Otago—Naseby, *Petrie!* 1500-2500 ft. December-January.

17. *L. flabellatum*, *T. Kirk*, *Students' Fl.* 205.—Minute, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. high. Leaves all radical, $\frac{1}{4}$ -1 in. long, coriaceous, linear, pinnate; leaflets 1-3 pairs but sometimes reduced to a single one, $\frac{1}{5}$ - $\frac{1}{3}$ in. diam., flabellate or orbicular-rhomboid, rounded at the tip, sessile, entire or minutely sinuate-crenate; margins recurved; petioles rather stout, with broad sheathing bases. Umbels small, compound, on short peduncles rarely exceeding the leaves; rays 3-4; general involucre apparently wanting; partial involucre of 3 broad connate bracts open on one side. Fruit broadly oblong or ovate; carpels 4- or 5-winged, not seen quite ripe.

STEWART ISLAND: Crevices of syenitic rocks near the South Cape, *Kirk!*

A very curious little plant, nearest to *L. Enysii*, but amply distinct. The 3-lobed partial involucre is quite unlike that of any other New Zealand species.

10. ANGELICA, Linn.

Perennial herbs, often tall and stout, usually erect, rarely scrambling or subscandent. Leaves pinnate or 2-3-pinnate. Umbels compound, dioecious or polygamous. Calyx-teeth usually obsolete, rarely prominent. Petals incurved at the apex. Fruit ovate or oblong, more or less dorsally flattened with a broad commissure; carpels 5-ribbed, the 2 lateral ribs very broad, forming a wing on each side of the carpel, the 3 dorsal much smaller and narrower. Vittæ 1 or 2 in each furrow, rarely more. Seed much dorsally compressed, plane or concave on the inner face.

A genus of about 30 species, in the Northern Hemisphere scattered through North America, Europe, and western Asia, in the Southern Hemisphere restricted to the five following species endemic in New Zealand.

* Herbaceous, erect. Leaves mostly radical.

Tall, stout, 1-2 ft. Leaves pinnate; leaflets many, 1-2 in., crenate	1. <i>A. Gingidium</i> .
Slender, 3-6 in. Leaves pinnate; leaflets many, pinnatifid	2. <i>A. decipiens</i> .
Slender, 3-9 in. Leaves 3-foliolate or pinnate; leaflets 1-2 pairs, rhomboid-orbicular, crenate	3. <i>A. trifoliolatum</i> .

** Suffruticose, subscandent. Leaves cauline.

Leaves 1-foliolate or 3-foliolate; leaflets small, $\frac{1}{4}$ - $\frac{1}{2}$ in.	4. <i>A. geniculata</i> .
Leaves pinnate; leaflets 2-5 pairs, large, 1-2 $\frac{1}{2}$ in.	5. <i>A. rosafolia</i> .

1. *A. Gingidium*, *Hook. f. Handb. N.Z. Fl.* 97.—A stout, erect, highly aromatic herb, 1-2 ft. high. Root thick and fleshy. Stems $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. at the base, smooth and striate, sparingly branched

above. Radical leaves 6–15 in. long, rather fleshy, glaucous, pinnate; leaflets 5–10 pairs, close together or the lower rather distant, 1–2 in. long, sessile, obliquely ovate or ovate-oblong, obtuse, finely crenate or serrate, rarely lobed, veins finely reticulate; petioles stout, often longer than the blade, sheath narrow. Umbels few, compound, 1–3 in. diam.; rays 10–20, slender, spreading; involucre wanting; partial umbels usually with an involucre of a few linear bracts. Flowers white. Fruit $\frac{1}{8}$ in. long, ovate-cordate; carpels much compressed, with a broad lateral wing on each side, which is produced downwards at the base; dorsal ribs small; vittæ 1 in each furrow and 2 on the commissural face.—*Kirk, Students' Fl.* 212. *Anisotome Gingidium*, *Hook. f. Fl. Nov. Zel.* i. 89. *Ligusticum Gingidium*, *Forst. Prodr.* n. 140. *Gingidium montanum*, *Forst. Char. Gen.* 21.

NORTH AND SOUTH ISLANDS: From Taupo southwards to Otago; once very abundant, but as it is everywhere greedily eaten by stock it has become scarce in many districts. Sea-level to 4000 ft. *Anisoid.* November–January.

2. **A. decipiens**, *Hook. f. Handb. N.Z. Fl.* 98.—Very aromatic, 3–8 in. high. Root stout, thick and woody. Leaves numerous, spreading, usually all radical, 3–6 in. long, pinnate; leaflets 6–10 pairs, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, sessile, ovate or ovate-oblong, membranous or flaccid, irregularly deeply toothed or pinnatifid; lobes linear, acute, not bristle-pointed; petioles shorter than the blade, sheath broad. Flowering-stems several, usually unbranched, equalling or longer than the leaves. Umbels compound, $\frac{1}{2}$ –1½ in. diam.; rays 4–8, unequal, $\frac{1}{3}$ –1 in. long; involucre bracts few, ovate-lanceolate. Flowers small, white. Fruit $\frac{1}{8}$ in. long, oblong, rounded or slightly cordate at the base; carpels 5-winged, the 2 lateral wings much wider than the 3 dorsal. Vittæ 1 under each furrow and 2 on the commissural side.—*Aciphylla decipiens*, *Hook. f. and Benth. Gen. Plant.* i. 916. *Ligusticum decipiens*, *Kirk, Students' Fl.* 205.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to Otago. 2000–6000 ft. December–January.

Closely resembling *Ligusticum aromaticum* in foliage, but the inflorescence and fruit are altogether different. Mr. Kirk refers it to *Ligusticum*; but all the fruiting specimens I have seen have the lateral wings of the carpels much wider than the dorsal.

3. **A. trifoliolata**, *Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 425.—Slender, perfectly glabrous, 3–9 in. high; stems creeping and rooting at the base; branches few, spreading. Leaves on rather long slender petioles, 3-foliolate or pinnate; leaflets few, in 1 or 2 distant pairs, simple or again ternately divided; petiolule slender, $\frac{1}{2}$ –1½ in. long; blade $\frac{1}{2}$ in., rhomboid-orbicular or flabellate, cuneate at the base, crenate-dentate at the rounded tip, rather membranous, glaucous below; veins reticulated. Umbels small, compound; primary rays few, secondary 3–5; involucre bracts minute,

linear. Flowers small, white; styles rather long, slender, spreading. Fruit $\frac{1}{4}$ in. long, narrow ovate-cordate; carpels compressed, with a broad lateral wing on each side, dorsal ribs narrower but conspicuous. Vittæ 1 under each furrow and 2 on the commissural face.—*Ligusticum trifoliatum*, *Hook. f. Handb. N.Z. Fl.* 97; *Kirk, Students' Fl.* 206.

SOUTH ISLAND: Canterbury—Swampy ground near the Kowai River, *Haast, Cockayne*!

Apparently a very rare and local plant, quite unlike any other species. I have only seen one rather indifferent specimen.

4. **A. geniculata**, *Hook. f. Handb. N.Z. Fl.* 98.—Stems 2–5 ft. long, much branched, scrambling over rocks and shrubs; branches slender, terete, flexuose; internodes 1–3 in. long. Leaves small, alternate, 1-foliolate, of young plants 3-foliolate or 3-lobed; petiole slender, $\frac{1}{4}$ – $\frac{1}{2}$ in. long; sheaths broad, produced into 2 blunt lobes at the top; leaflets $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., orbicular-ovate or rhomboid or transversely oblong, often cuneate at the base, rounded at the tip, obscurely crenate-dentate, rather thin and membranous, finely reticulate. Umbels small, terminal and lateral, on short peduncles; rays 2–5, very slender, about $\frac{1}{3}$ in. long; involucre bracts few, short, linear-subulate. Flowers small, white; petals inflexed at the tips. Fruit $\frac{1}{5}$ in. long, oblong-ovoid, cordate at the base; carpels much compressed, the lateral wings very broad, pale and membranous. Vittæ 1 under each furrow and 2 on the commissure.—*Kirk, Students' Fl.* 213. *Anisotome geniculata*, *Hook. f. Fl. Nov. Zel.* i. 90, t. 19. *Peucedanum geniculatum*, *Forst. Prodr.* n. 136; *A. Rich. Fl. Nouv. Zel.* 272; *A. Cunn. Precur.* n. 507. *Bowlesia geniculata*, *Spreng. Umbellif.* 14, t. 5.

NORTH ISLAND: Rare and local. East Cape and interior, *Colenso*; Port Nicholson, *Buchanan*! *Paikakariki*, *H. B. Kirk*. SOUTH ISLAND: *Akaroa*, *Raoul*, *Kirk*! gorge of the Waimakariri, *Cockayne*; east coast of Canterbury and Otago, *Armstrong, Buchanan*! *Petrie*! *G. M. Thomson*! January–February.

5. **A. rosæfolia**, *Hook. Ic. Plant.* t. 581.—Stems 2–5 ft. long, much branched, scrambling over rocks or among bushes, hard and almost woody below, clothed with the persistent sheaths of the old leaves. Leaves cauline, alternate, 2–5 in. long, pinnate; leaflets 2–5 pairs, 1–2½ in. long, opposite, sessile, ovate or ovate-oblong to ovate-lanceolate, often oblique at the base, acute, finely serrate, submembranous or coriaceous, veins reticulated; petiole slender, rigid; sheaths broad, membranous, 2-lobed at the top. Umbels many, terminal and axillary, compound, 1–3 in. diam.; rays numerous, slender; involucre bracts linear or lanceolate. Flowers white. Fruit $\frac{1}{8}$ in. long, ovate-cordate; carpels with broad lateral wings. Vittæ 1 under each furrow and 2 on the commissural face.—*Hook. f. Handb. N.Z. Fl.* 98; *Kirk, Students' Fl.* 212. *Anisotome rosæfolia*, *Hook. f. Fl. Nov. Zel.* i. 90.

NORTH ISLAND: Not uncommon on rocky shores from the Three Kings Islands to the East Cape and Raglan; rare inland, and much less abundant further south. Hawke's Bay, *A. Hamilton!* *Petrie!* Ruahine Range, *Harding!* Upper Rangitikei, *Buchanan!* SOUTH ISLAND: Akaroa, *Raoul.* Sea-level to 2000 ft. *Koherika; Kohepiro.* October–November.

This and the preceding species are anomalous in the order from their subscandent stems. The leaflets are furnished with a pair of minute stipellæ at the base—one on the upper surface, the other below.

11. DAUCUS, Linn.

Annual or biennial herbs, usually hispid. Leaves decompose, ultimate segments narrow. Umbels compound; rays numerous; bracts of the general involucre usually pinnatisect. Flowers white. Calyx-teeth small or obsolete. Petals often unequal, inflexed at the tips. Fruit ovoid or oblong, terete or slightly dorsally compressed; carpels convex, with 5 slender bristly primary ribs, and 4 winged secondary ones bearing rows of hooked bristles. Vittæ 1 under each secondary rib and 2 on the commissural face. Seed flattened dorsally.

Species about 35, chiefly found in the temperate portions of the Northern Hemisphere, and most abundant in the Mediterranean region. The single New Zealand species is also common in Australia and Tasmania.

1. *D. brachiatus*, *Sieb. in D.C. Prodr.* iv. 214.—An erect annual or biennial branching herb, very variable in size, 6–18 in. high, more or less bristly with short stiff hairs, rarely almost glabrous. Leaves flaccid, on long slender petioles, 2–3-pinnate; primary leaflets 4–6 pairs; secondary deeply incised or pinnatifid; segments small, linear-oblong, minutely mucronulate. Umbels axillary or terminal, compound; primary rays 4–10, very unequal in size; involucre bracts entire or pinnately divided. Flowers small. Fruit ovoid, about $\frac{1}{8}$ in. long; carpels with the secondary ridges much the largest, and bearing a single row of purplish hooked bristles; primary with a double row of finer bristles pointing right and left.—*Hook. f. Fl. Nov. Zel.* i. 91; *Handb. N.Z. Fl.* 99; *Benth. Fl. Austral.* iii. 376; *Kirk, Students' Fl.* 214. Scandix glochidiata, *Labill. Fl. Nov. Holl.* i. 75, t. 102.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in lowland districts throughout. October–December.

The allied *D. carota*, L., the origin of the cultivated carrot, has become naturalised in several localities in both islands. It can be distinguished from *D. brachiatus* by its greater size, broader leaf-segments, and much larger compact flat-topped umbels.

ORDER XXXIV. ARALIACEÆ.

Trees or shrubs, rarely herbs. Leaves alternate or very rarely opposite, simple or digitately or pinnately divided, often large; stipules adnate to the base of the petiole or wanting. Flowers regular, hermaphrodite or polygamous or diœcious, usually arranged

in simple or compound umbels, less often in racemes or panicles. Calyx-tube adnate to the ovary; limb truncate or toothed or almost obsolete. Petals usually 5, seldom 4 or more than 5, valvate or slightly imbricate. Stamens as many as the petals, and inserted with them round the margin of an epigynous disc; filaments usually inflexed. Ovary superior, 2- to many-celled, rarely 1-celled; styles as many as the cells, free or connate; ovules solitary, pendulous, anatropous. Fruit drupaceous, indehiscent; epicarp usually succulent; cells 2 to many, 1-seeded. Seeds pendulous; testa membranous; albumen copious, fleshy; embryo minute, radicle next the hilum.

An order very closely allied to *Umbelliferae*, principally differing in the arborescent habit, valvate petals, ovary usually more than 2-celled, and succulent fruit. The species are mainly tropical or subtropical, few of them extending into the temperate zones. Genera 40; species about 350. The properties of the order are unimportant. Of the 6 genera found in New Zealand, *Stilbocarpa* and *Pseudopanax* are endemic; *Aralia* mainly belongs to the north temperate zone, *Meryta* and *Schefflera* are chiefly Polynesian, while *Panax* has a wide range in the Old World.

* The New Zealand species herbaceous, with broad orbicular-reniform leaves. Petals imbricate.

Fruit globose, cup-shaped or hollowed at the top ..	1. STILBOCARPA.
Fruit globose, not hollowed at the top	2. ARALIA.

** Shrubs or trees. Petals valvate. Stamens equal in number to the petals.

Leaves simple or digitate. Ovary 2-celled, rarely 3-4-celled.	
Styles distinct, recurved at the apex	3. PANAX.
Leaves simple, very large. Flowers paniculate	4. MERYTA.
Leaves digitate. Umbels small, racemed on the branches of a large spreading panicle	5. SCHEFFLERA.
Leaves simple or digitately divided. Ovary usually 5-celled. Styles very short, connate into a cone or column	6. PSEUDOPANAX.

1. **STILBOCARPA**, A. Gray.

A stout much-branched herb; stem fistulose. Leaves large, orbicular or reniform, setose; petiole with broad membranous stipuliform sheaths. Umbels 3 or 4 times compound, forming a large globose head 6-9 in. diam.; involucre bracts foliaceous. Flowers polygamous, jointed on the top of the pedicel. Calyx-tube 3-4-grooved; limb obsolete. Petals 5, obovate, obtuse, imbricate in the bud. Stamens 5; anthers ovate. Disc fleshy, annular, 3-4-lobed. Ovary 3-4-celled; styles as many as the cells, recurved. Fruit globose, depressed and hollow at the summit, obscurely 3-4-grooved, dry and corky, covered with a black and shining epidermis, 3-4-celled. Seeds as many as the cells.

A monotypic genus, confined to the islands immediately to the south of New Zealand. It is chiefly separated from *Aralia* by the hollow axis of the fruit, which gives the summit a peculiar cup-shaped appearance.

1. **S. polaris**, *A. Gray, Bot. U.S. Expl. Exped.* 714.—Forming large rounded masses 3–5 ft. in diam., more or less bristly in all its parts. Rhizome prostrate, 2–3 ft. long, thick and fleshy, annulate. Stems much branched below, stout, 1–1½ in. diam., grooved, succulent, with a heavy rank smell when bruised. Leaves bright-green, 9–18 in. diam., orbicular-reniform, thick and fleshy, bristly on both surfaces, plaited or rugose, margins many-lobed and sharply toothed, veins flabellate; petiole 12–24 in. long, erect, semi-terete; sheath amplexicaul, produced above into a leafy lobed or lacinate membranous ligule. Umbels large, terminal and axillary, compound. Flowers very numerous, ¼ in. diam., waxy-yellow with a purplish centre, shining. Fruit the size of a small peppercorn, globose with a flattened and hollowed apex, black, brilliantly shining.—*Hook. f. Handb. N.Z. Fl.* 100; *Kirk, Students' Fl.* 215. *Aralia polaris*, *Homb. et Jacq. Voy. au Pole Sud, Bot.* t. 2, *Phanerog.*; *Hook. f. Fl. Antarct.* i. 19; *Ice. Plant.* t. 747.

AUCKLAND, CAMPELL, ANTIPODES, AND MACQUARIE ISLANDS: Not uncommon. December–January.

2. **ARALIA**, Linn.

Perennial herbs or shrubs, glabrous or setose or prickly. Leaves alternate, rarely simple, usually digitate or pinnate or pinnately decomposed. Umbels solitary or in racemes or panicles, rarely compound; pedicels usually jointed under the flowers. Flowers polygamo-monoëcious. Calyx-margin truncate or 5-toothed. Petals 5, slightly imbricate. Stamens 5. Ovary 2–5-celled; styles 2–5, free or connate at the base, at length spreading. Fruit 3–5-celled and 3–5-angular, or subglobose and 2–3-celled.

A well-known genus of about 30 species, mainly natives of the Northern Hemisphere, stretching from Malaya and India to Japan and North America.

1. **A. Lyallii**, *T. Kirk in Trans. N.Z. Inst.* xvii. (1885) 295.—A stout herb 1–4 ft. high, often forming extensive patches. Rhizome prostrate or arcuate, creeping. Stems stout, as thick as the little finger, pilose. Leaves radical, crowded, 6–18 in. diam. or more, orbicular-reniform, lobed and deeply toothed, usually glabrous and shining above, more or less clothed with soft bristles beneath; petiole terete, fistulose, with a broad membranous sheathing ligule at the base. Umbels large, compound, forming globose masses 6–12 in. diam. Flowers monoëcious or polygamous, ¼ in. diam., reddish-purple. Calyx-margin truncate. Petals 5, linear or linear-oblong. Ovary 2-celled, crowned by two broad and fleshy stylopodia; styles 2, free. Fruit globose, ½ in. diam., 2-celled, black and shining; seeds 1 in each cell.—*Students' Fl.* 216. *Stilbocarpa Lyallii*, *Armst. in Trans. N.Z. Inst.* xiii. (1881) 336.

Var. **robusta**, *Kirk, Students' Fl.* 216.—More robust and less pubescent. Leaves with the teeth strongly mucronate; petioles plano-convex, solid or nearly so. Flowers smaller, with yellowish petals.

SOUTH ISLAND : Coal Island, Preservation Inlet, *Kirk* ! STEWART ISLAND and adjacent islets, *Lyall*, *Petrie* ! *Kirk* ! Var. *robusta* : The Snares, *Kirk* ! *Punui*. December-February.

Has precisely the habit of *Stilbocarpa polaris*, and in a flowerless state may easily be taken for it. The leaves are less fleshy and coriaceous, and want the bristles on the upper surface; the petioles are terete; the flowers reddish, with narrower petals; the ovary 2-celled, crowned with the very evident stylopodia; and the fruit is not hollowed at the apex.

3. **PANAX**, Linn.

Evergreen trees or shrubs. Leaves simple or more usually digitately or pinnately divided. Flowers polygamous or diœcious, jointed at the top of the pedicels, umbellate; umbels simple or compound, variously arranged. Calyx-limb entire or 5-toothed. Petals 5, valvate. Stamens 5. Ovary 2- or rarely 3-4-celled; styles free or connate at the base, their tips free, usually recurved. Fruit compressed or nearly globose, 2-4-celled, exocarp succulent or coriaceous; seeds 1 in each cell.

Species between 30 and 40, mainly Australasian, Polynesian, and Malayan, but extending to central Asia and tropical Africa. The New Zealand species are all endemic.

* Leaves of both old and young plants simple.

Leaves of young plants narrow-linear, 5-10 in. long; of old plants linear or lanceolate, 2-3 in. 1. *P. lineare*.

** Leaves of old plants simple; of young ones 3-5-foliolate.

Leaflets 2-5 in., lanceolate, serrate. Styles 2 2. *P. simplex*.
 Leaflets 2-8 in., oblong-lanceolate, entire. Styles 3-4 3. *P. Edgerleyi*.
 Leaflets small, $\frac{1}{3}$ - $\frac{2}{3}$ in., orbicular or obovate. Styles 2 4. *P. anomalum*.

*** Leaves of old plants 3-5- or 7-foliolate.

Leaves 3-5-foliolate; petioles not sheathing. Umbels small. Fruit compressed 5. *P. Sinclairii*.
 Leaves 3-5-foliolate; petioles sheathing; leaflets sessile, veins indistinct. Umbels large, compound 6. *P. Colensoi*.
 Leaves 5-7-foliolate; petioles sheathing; leaflets stalked, veins obvious. Umbels very large, compound 7. *P. arboreum*.

1. **P. lineare**, *Hook. f. Fl. Nov. Zel.* i. 93.—A small sparingly branched shrub 5-10 ft. high; branches spreading, stout and woody, bearing numerous simple or trifid coriaceous scales mixed with the leaves. Leaves of young trees crowded, ascending, simple, 5-10 in. long, $\frac{1}{5}$ - $\frac{1}{3}$ in. wide, narrow-linear, acute, gradually narrowed into a short stout petiole, remotely and obscurely sinuate-serrate, excessively thick and coriaceous, midrib and margins thickened. Leaves of mature trees 2-4 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. wide, linear or linear-lanceolate, obtuse or acute, obscurely serrate, very thick and coriaceous, midrib and margins thickened; petiole short, $\frac{1}{8}$ - $\frac{1}{6}$ in. long, jointed on to the branch. Flowers small, diœcious. Umbels usually terminal, but occasionally axillary as well, compound, shorter than the leaves; rays 3-7, bracteolate. Ovary 3-5-celled; styles the same number as

the cells, connate at the base, free and recurved at the tips. Fruit broadly ovoid, 3-5-celled and -seeded.—*Handb. N.Z. Fl.* 101; *Kirk, Students' Fl.* 217.

SOUTH ISLAND: Subalpine forests from Nelson to Preservation Inlet, chiefly on the western side of the island. 2500-4000 ft. January-February.

2. **P. simplex**, *Forst. Prodr.* n. 399.—A shrub or small tree 8-25 ft. high, everywhere smooth and glabrous. Leaves excessively variable, polymorphous; of very young plants either ovate or broadly ovate, serrate, or 3-5-foliolate with the leaflets deeply lobed or pinnatifid: both these states are succeeded by 3-foliolate leaves with lanceolate or oblong-lanceolate sharply serrate leaflets. Leaves of mature trees 1-foliolate, variable in size, 2-5 in. long, lanceolate to oblong- or obovate-lanceolate, coriaceous and glossy, acute or acuminate, rarely obtuse, sharply serrate or nearly entire; petiole 1-3 in. long, jointed at the top. Umbels small, shorter than the leaves, axillary or terminal, irregularly compound; secondary umbels 8-16-flowered, the terminal one usually female, the lateral male. Flowers small, greenish-white. Ovary 2-celled; styles 2, free to the base, recurved. Fruit $\frac{1}{2}$ in. diam., orbicular, compressed; seeds 2.—*A. Rich. Fl. Nov. Zel.* 280, t. 31; *A. Cunn. Precur.* n. 509; *Raoul, Choix*, 46; *Hook. f. Fl. Antarct.* i. 18, t. 12; *Fl. Nov. Zel.* i. 93; *Handb. N.Z. Fl.* 100; *Kirk, Forest Fl.* t. 106, 107; *Students' Fl.* 217.

Var. **quercifolium**, *Kirk, l.c.*—Leaves of mature plants 1-foliolate, 3-5 long, lanceolate, deeply lobulate or pinnatifid.—*Forest Fl.* t. 106, f. 2.

Var. **parvum**, *Kirk, l.c.*—Leaves of mature plants 1-foliolate, $\frac{3}{4}$ -1 in. long acute or subacute, crenate or serrate. Umbels few-flowered.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: From the Thames Goldfields southwards, but local north of the East Cape. Var. *quercifolium*: Canterbury—Upper Waimakariri, *Enys*! Var. *parvum*: Various localities from Nelson to Stewart Island, *Kirk*! *Petrie*! *H. J. Matthews*! *T. F. C.* Sea-level to over 4000 ft. *Haumakaroa*. November-January.

3. **P. Edgerleyi**, *Hook. f. Fl. Nov. Zel.* i. 94.—A small graceful tree 20-40 ft. high; trunk 12-18 in. diam. Leaves very aromatic, bright glossy green, smooth and shining, membranous, dimorphic: of mature plants 1-foliolate; petiole jointed to the blade, slender, 1-3 in. long; blade 2-8 in., oblong- or obovate-lanceolate to lanceolate, acute or acuminate, quite entire: of young plants 3-5-foliolate with the leaflets deeply and irregularly lobed or pinnatifid. Umbels small, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., 10-12-flowered, in slender axillary or lateral panicles 1-2 in. long. Flowers small, greenish-white. Ovary 3-4-celled; styles as many as the cells, connate at the base. Fruit $\frac{1}{2}$ in. diam., globose; seeds 3-4.—*Handb. N.Z. Fl.* 101; *Kirk, Forest Fl.* t. 44; *Students' Fl.* 217. *Raukana Edgerleyi*, *Seem. Journ. Bot.* iv. (1866) 352.

Var. **serratum**, Kirk, *Forest Fl.* t. 45.—Leaves of mature plants with the margins serrated or lobulate.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in hilly forests from Hokianga southwards. Var. *serratum*: Stewart Island, Kirk! Sea-level to 2500 ft. *Raukawa*; *Koare*. January–February.

The Maoris formerly mixed the fragrant leaves with fat or oil, which was then used for anointing the person.

4. **P. anomalum**, Hook. in *Lond. Journ. Bot.* ii. (1843) 422, t. 12.—A much-branched shrub 5–12 ft. high; branches spreading at right angles, younger ones usually clothed with small bristly scales. Leaves of young plants 3-foliolate; petioles long, slender, winged; leaflets jointed on to the petiole, stipellate at the base, elliptic-ovate or orbicular-ovate, sometimes lobed, toothed or crenate, usually membranous. Leaves of mature plants 1-foliolate; petiole very short, seldom more than $\frac{1}{8}$ in. long; leaflet $\frac{1}{8}$ – $\frac{2}{3}$ in. long, orbicular or oblong-orbicular, rarely narrower and oblong-obovate, rounded at the tip, obscurely crenate, rather coriaceous, usually with minute linear stipellæ at the base. Umbels small, simple, axillary, 2–8-flowered; peduncles very short. Flowers minute, greenish. Ovary 2-celled; styles 2, free. Fruit $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., orbicular, much compressed, 2-celled, mottled.—Hook. f. *Fl. Nov. Zel.* i. 93; *Handb. N.Z. Fl.* 101; Kirk, *Students' Fl.* 218.

Var. **microphyllum**, Kirk, l.c. — Smaller and more slender. Leaves smaller, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, obovate-lanceolate to broadly obovate, sinuate-crenate.—*P. microphyllum*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 328.

NORTH AND SOUTH ISLANDS: Not uncommon in woods from Mongonui and Kaitia southwards, ascending to 2500 ft. *Wauwauapaku*. December–February.

A very curious plant, with the habit of *Melicytus micranthus* or *Melicope simplex*, quite unlike a *Panax*. Mr. Colenso's *P. microphyllum* is the common form south of the Waikato, but it differs little from the type.

5. **P. Sinclairii**, Hook. f. *Handb. N.Z. Fl.* 103.—A branching shrub or small tree 6–15 ft. high. Leaves 3–5-foliolate; petioles 2–3 in. long, slender, not sheathing at the base; leaflets sessile or very shortly stalked, 1–3 in. long, obovate- or oblong-lanceolate, acute or acuminate, dull-green, coriaceous, sharply serrate; veins obscure. Umbels small, unisexual, axillary or terminal, 3–10-flowered or more, on simple or branched peduncles 1–1½ in. long; pedicels short. Calyx minutely 5-toothed. Ovary 2-celled; styles 2, short, recurved. Fruit orbicular, compressed, 2-celled, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam.—Kirk, *Students' Fl.* 219.

NORTH ISLAND: Thames Goldfields, Adams! Te Aroha, Pirongia and Karioi Mountains, T. F. C.; Opepe, Taupo, Kirk! East Cape, Sinclair; Ruahine Mountains, Colenso; Mount Egmont, Buchanan! T. F. C. 1000–3500 ft. January–February.

Very closely allied to *P. simplex*, from which it is chiefly separated by the leaves being 3–5-foliolate, never 1-foliolate.

6. **P. Colensoi**, *Hook. f. Fl. Nov. Zel.* 94, t. 21.—A glabrous shrub or small tree, 5–15 ft. high; branches stout, spreading. Leaves 3–5-foliolate; petioles 2–9 in. long, with a stout 2-lobed sheathing base; leaflets 2–6 in., obovate- or oblong-lanceolate, acute or obtuse, sessile or shortly petioled, coarsely serrate, thick and coriaceous, smooth and glossy, veins usually indistinct. Flowers diœcious. Umbels large, compound, terminal, similar to those of *P. arboreum* but smaller and with fewer primary rays; secondary rays $\frac{1}{2}$ –1 in. long, pedicels short. Ovary 2-celled; styles 2, slightly connate at the base, tips spreading, recurved. Fruit orbicular, $\frac{1}{4}$ in. diam., much compressed, 2-celled, purplish-black.—*Handb. N.Z. Fl.* 102; *Kirk, Students' Fl.* 218.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In hilly or mountainous districts from the Little Barrier Island and Cape Colville southwards. Usually from 1500–4500 ft., but descending to sea-level on Stewart Island. December–February.

Very closely allied to *P. arboreum*, but the leaves are 3–5-foliolate (not 5–7-foliolate), the leaflets are sessile or nearly so, and the veins are usually indistinct.

7. **P. arboreum**, *Forst. Prodr.* n. 398.—A small much-branched round-headed tree 12–25 ft. high; branches stout, brittle. Leaves digitately 5–7-foliolate; petioles stout, 2–10 in. long, with a broad 2-lobed sheath at the base; leaflets 3–7 in., on petioles $\frac{1}{2}$ –1 in. long, broad- or narrow-oblong or obovate-oblong, obtuse or acute, serrate or sinuate-serrate, coriaceous, smooth and shining, veins distinct. Umbels large, terminal, compound, diœcious; primary rays 8–12, radiating, 2–4 in. long; secondary 10–20, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, each bearing a 10–15-flowered umbel; pedicels short, slender. Flowers $\frac{1}{4}$ in. diam. Ovary 2-celled; styles 2, connate at the base, tips free, recurved. Fruit broader than long, compressed, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., purplish-black, 2-celled; seeds 1 in each cell.—*A. Rich. Fl. Nouv. Zel.* 281; *A. Cunn. Precur.* n. 510; *Raoul, Choix*, 46; *Hook. in Lond. Journ. Bot.* ii. (1843) 421, t. 11; *Hook. f. Fl. Nov. Zel.* i. 94; *Handb. N.Z. Fl.* 102; *Kirk, Students' Fl.* 219.

Var. **lætum**, *Kirk, l.c.*—Leaflets much larger, 7–10 in. long, 3–4 in. broad, broadly ovate-lanceolate or obovate, abruptly acuminate, coarsely serrate or dentate.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS.—Abundant in lowland districts throughout. Var. *lætum*; Thames Goldfields, *Kirk! T. F. C.* Sea-level to 1500 ft. *Whauwhau-paku.* June–July.

4. **MERYTA**, Forst.

Small glabrous trees, usually more or less resinous. Leaves large, alternate, simple, coriaceous. Flowers diœcious, in terminal panicles. Male flowers: Calyx-limb obsolete or minutely 3–5-toothed. Petals 4–5, valvate. Stamens 4–5; filaments rather long; anthers ovate-oblong. Females: Calyx-limb obsolete. Petals 4–5, small. Ovary 4- to many-celled; styles thick, distinct

or slightly connate at the base, their tips at length recurved. Fruit broadly oblong or nearly globose; endocarp succulent; cells 3-6, 1-seeded. Seeds compressed.

A small genus of from 10 to 15 species, most abundant in New Caledonia, but extending eastwards to Tahiti and southwards to Norfolk Island and New Zealand. The single species found in New Zealand is endemic.

1. **M. Sinclairii**, *Seem. in Bonplandia*, x. (1862) 295.—A very handsome round-headed small tree 8-25 ft. high; trunk 6-18 in. diam.; branches stout, brittle. Leaves very large, crowded towards the ends of the branches; petiole stout, 4-15 in. long; blade 10-20 in. long or more, oblong-obovate or oblong, obtuse, slightly cordate at the base, very coriaceous, smooth and shining, strongly veined; margins entire, slightly undulate, bordered with a stout vein. Panicles stout, erect, terminal, 6-18 in. long; branches jointed on the rhachis. Male flowers sessile in clusters of 4-8, with a broad bract at the base of each cluster. Calyx-limb obsolete. Petals 4, ovate-oblong. Stamens 4; filaments slender, exserted. Female flowers irregularly crowded, with a bract at the base of each. Calyx as in the males. Petals 4-5, ovate-triangular. Abortive stamens present. Styles 4-5, free to the base. Fruit $\frac{1}{3}$ - $\frac{1}{2}$ in. long, broadly oblong, succulent, black and shining, 4-5-celled. Seeds solitary in each cell, compressed, bony.—*Hook. f. Handb. N.Z. Fl.* 104; *Kirk, Forest Fl.* t. 121; *Students' Fl.* 220. *Botryodendrum Sinclairii*, *Hook. f. Fl. Nov. Zel.* i. 97.

NORTH ISLAND: Three Kings Islands, *T. F. C.*; Hen and Chickens (Taranga Islands), *Hutton and Kirk! T. F. C.* *Puka.* February-May.

The specimens on which Sir Joseph Hooker founded the species were obtained from a solitary tree planted by the Maoris at Paparaumu, in Whangaruru Harbour; but it is not known in an indigenous state on any part of the mainland, and must be considered one of the rarest species of the New Zealand flora. The Maoris state that it exists on the Poor Knights Islands, between Whangarei and the Bay of Islands, but I have seen no specimens from thence.

5. **SCHEFFLERA**, Forst.

Glabrous shrubs or small trees. Leaves alternate, digitately compound; leaflets serrulate. Flowers polygamous, in small umbels arranged in a racemose manner on the branches of a spreading panicle; pedicels not articulate. Calyx-limb minutely 5-toothed. Petals 5, valvate. Stamens 5. Disc large, with undulate margins. Ovary 5-10-celled; styles the same number as the cells, connate below, free and spreading above. Fruit subglobose, 5-10-celled; exocarp fleshy; seeds 1 in each cell.

In addition to the single New Zealand species, which is endemic, there are one or two in the Fiji Islands, and several in New Caledonia.

1. **S. digitata**, *Forst. Char. Gen.* 46.—A small tree 10-25 ft. high, with stout spreading branches. Leaves on sheathing petioles 4-9 in. long, digitately 7-10-foliolate; leaflets 3-7 in., petiolate,

oblong- or obovate-lanceolate, acuminate, thin and membranous, finely and sharply serrate, in young plants often irregularly lobulate or pinnatifid. Panicles axillary or from the branches below the leaves, 8–12 in. long; branches numerous, long, spreading at right angles. Flowers small, greenish, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., in 4–8-flowered umbels arranged in a racemose manner along the branches of the panicle; peduncles $\frac{1}{2}$ in. long; pedicels $\frac{1}{4}$ in. Fruit globose, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam., juicy, grooved when dry.—*Hook. f. Handb. N.Z. Fl.* 103; *Kirk, Students' Fl.* 220. *S. Cunninghamii*, *Miq. in Linnæa*, xviii. (1844) 89. *Aralia Schefflera*, *Spreng. Pl. Pugill.* i. 28; *A. Rich. Fl. Nouv. Zel.* 283; *A. Cunn. Precur.* n. 513; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 95, t. 22.

NORTH AND SOUTH ISLANDS: Abundant in woods from the North Cape to Stewart Island, ascending to nearly 3000 ft. *Pate; Patete.* February–March.

6. PSEUDOPANAX, C. Koch.

Glabrous shrubs or small trees. Leaves extremely variable, simple or digitately compound, those of young plants often widely different from those of mature trees; leaflets coriaceous, entire or more or less toothed or serrate. Flowers diœcious, in racemose or paniculate umbels. Calyx-limb entire or toothed. Petals 5, valvate. Stamens 5; anthers ovate or oblong. Ovary 5-celled; styles the same number, very short, connate into a short cone or column. Fruit fleshy, subglobose, ribbed when dry, 5-celled; seeds 1 in each cell.

As characterized above, the genus contains 6 species, all confined to New Zealand. It is mainly distinguished from *Panax* by the 5-celled ovary and 5 styles, the latter being very short and connate into a minute cone or column. It would form a much more natural group if it were limited to *P. crassifolium*, *P. ferox*, and *P. chathamicum*, together with *Panax lineare*, which in several respects is closely allied to *P. crassifolium*, and which occasionally has a 5-celled ovary.

* Leaves of young plants not markedly different from those of old ones.

- | | |
|---|--------------------------|
| Bronzy or yellow-green. Leaves 3–5-foliolate; leaflets sharply toothed, veined | 1. <i>P. discolor</i> . |
| Dark-green. Leaves 3–5-foliolate; leaflets entire or sinuate-serrate, veins obscure | 2. <i>P. Lessonii</i> . |
| Dark-green. Leaves mostly 1-foliolate, with a few 3-foliolate ones intermixed | 3. <i>P. Gilliesii</i> . |

** Leaves of young plants altogether different from those of old ones.

- | | |
|---|-----------------------------|
| Leaves of young trees deflexed, with short distant teeth. | |
| Fruit small, $\frac{1}{2}$ in. diam. | 4. <i>P. crassifolium</i> . |
| Leaves of young trees deflexed, with broad lobulate hooked teeth. Fruit large, oblong, $\frac{1}{2}$ in. long | 5. <i>P. ferox</i> . |
| Leaves of young trees never deflexed. Fruit large, globose, $\frac{1}{2}$ in. diam. | 6. <i>P. chathamicum</i> . |

1. *P. discolor*, *Cheesem.*—A much-branched shrub 6–15 ft. high. Leaves bronzy or yellow-green, 3–5-foliolate, often with 1-foliolate leaves intermixed; petioles slender, 1–3 in. long; leaflets $1\frac{1}{2}$ –3 in.,

obovate to obovate-lanceolate or elliptic-lanceolate, narrowed at the base, acute or acuminate, glossy and coriaceous, sharply serrate. Umbels terminal; male of 4–10 slender rays 2–3 in. long, bearing numerous racemose flowers on pedicels $\frac{1}{8}$ – $\frac{1}{4}$ in. long; females (or herinaphrodite?) of much shorter rays $\frac{3}{4}$ –2 in. long terminating in 2–6-flowered umbellules. Flowers $\frac{1}{6}$ in. diam. Ovary 5-celled; styles 5, connate at the base, very short, tips erect or slightly recurved. Fruit $\frac{1}{4}$ in. long, broadly oblong, 5-celled.—*Panax* discolor, *Kirk in Trans. N.Z. Inst.* iii. (1871) 178. *P. discolorum*, *Students' Fl.* 219.

NORTH ISLAND: Auckland—Whangaroa North, Great Barrier Island, and Omaha, *Kirk*! Little Barrier Island, *Kirk*, *Shakespear*! *T. F. C.*; Thames Goldfields, *Kirk*! *Adams*! *T. F. C.* Sea-level to 2800 ft. December–January.

The ovary-cells and styles are very exceptionally less than 5, and the species certainly falls into *Pseudopanax* as that genus is characterized in the “*Genera Plantarum*.” Its nearest ally is *P. Lessonii*.

2. **P. Lessonii**, *C. Koch in Wochenschrift*, ii. (1859) 336. — A glabrous much-branched shrub or small tree 8–20 ft. high; branches robust. Leaves dark-green, 3–5-foliolate; petioles stout, 2–6 in. long, not sheathing at the base; leaflets 1–4 in., sessile, obovate- or oblong-lanceolate, acute or obtuse, entire or sinuate-serrate, smooth and shining, very thick and coriaceous; veins indistinct. Umbels terminal, compound; males with 4–8 primary rays 1–6 in. long, each ending in 4–10 secondary rays bearing numerous racemose flowers; females with shorter and fewer rays and less numerous flowers, not so conspicuously racemose. Flowers $\frac{1}{5}$ in. diam. Ovary 5-celled; styles 5, very short, connate at the base, their tips at length recurved. Fruit broadly oblong, $\frac{1}{4}$ in. long, 5-celled.—*Kirk*, *Students' Fl.* 221. *Panax Lessonii*, *D.C. Prodr.* iv. 253; *Hook. f. Handb. N.Z. Fl.* 102. *Cussonia Lessonii*, *A. Rich. Fl. Nouv. Zel.* 285, t. 32; *A. Cunn. Precur.* n. 511; *Raoul, Choix*, 46. *Hedera Lessonii*, *A. Gray, Bot. U.S. Expl. Exped.* 719.

NORTH ISLAND: From the Three Kings Islands and the North Cape to Poverty Bay, usually near the coast. *Houmapara*; *Houpara*. January–February.

3. **P. Gilliesii**, *T. Kirk, Students' Fl.* 221.—A shrub or small tree 10–15 ft. high; branches slender. Leaves mostly 1-foliolate, mixed with a few 3-foliolate ones; petiole slender, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; blade $1\frac{1}{2}$ – $2\frac{1}{2}$ in., variable in shape, ovate to ovate-lanceolate or lanceolate, acute or acuminate, coarsely sinuate-toothed, rather coriaceous. Flowers long past in all the specimens seen, but apparently arranged in a racemose manner on numerous terminal peduncles 2–4 in. long; pedicels $\frac{1}{2}$ –1 in. Fruit $\frac{1}{4}$ in. long, broadly oblong, 5-celled; styles 5, very short, connate, free at the very tip.

NORTH ISLAND: Auckland—Whangaroa North, *Buchanan*! *Gillies* and *Kirk*!

I have seen but few specimens of this curious plant, which may be nothing more than a variety of *P. Lessonii*.

4. **P. crassifolium**, *C. Koch in Wochenschrift*, ii. (1859) 336.—A small round-headed tree 20–50 ft. high; trunk naked below, 9–18 in. diam. Leaves excessively variable, differing greatly at various stages of growth, the following being the chief forms: (1) of seedlings, rhomboid to ovate-lanceolate, cuneate at the base, coarsely toothed or lobed, membranous; (2) of young unbranched plants, deflexed, very narrow linear, 6–36 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. wide, remotely and acutely toothed, excessively rigid and coriaceous, dull-green above, often purplish below; (3) in a more advanced stage, during which the stem commences to branch and flowers may appear, the leaves are erect or spreading, and may be either (a) 1-foliolate, 6–12 in. long, $\frac{1}{2}$ – $1\frac{1}{2}$ in. wide, linear or linear-obovate, coarsely and acutely toothed, very coriaceous; or (b) 3–5-foliolate with sessile leaflets 6–12 in. long by $\frac{1}{2}$ – $\frac{3}{4}$ in. wide, coarsely and remotely toothed; (4) in the mature stage the leaves are 1-foliolate, 3–8 in. long, 1 – $1\frac{1}{2}$ in. wide, linear to linear-oblong or linear-obovate, obtuse or subacute, narrowed into stout petioles $\frac{1}{2}$ –1 in. long, entire, sinuate-serrate or coarsely toothed at the tip. Umbels terminal, compound; primary rays 4–10, 2–3 in. long; secondary 4–10, $\frac{1}{2}$ –1 in. long; flowers racemose or umbelled; pedicels short. Ovary 5-celled or rarely 4-celled by abortion; styles the same number as the cells, connate into a cone. Fruit globose, $\frac{1}{5}$ in. diam.—*Kirk, Forest Fl.* t. 38, 38A, 38B, 38C, 38D; *Students' Fl.* 222. *Aralia crassifolia*, *Sol. ex A. Cunn. Precur.* n. 514; *Hook. Ic. Plant.* t. 583, 584; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 96. *Panax crassifolium*, *Dcne. and Planch. in Rev. Hort.* (1854) 105; *Hook. f. Handb. N.Z. Fl.* 101; *Kirk in Trans. N.Z. Inst.* x. (1878) app. xxxiii. *P. longissimum*, *Hook. f. l.c.* 102. *P. coriaceum*, *Regel in Gartenfl.* (1859) 45. *Hedera crassifolia*, *A. Gray, Bot. U.S. Expl. Exped.* 719.

Var. *a*, **unifoliolatum**, *Kirk, Forest Fl.* 61.—Leaves of the third stage 1-foliolate.

Var. *b*, **trifoliolatum**, *Kirk, l.c.*—Leaves of the third stage 3–5-foliolate.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Var. *a* abundant from Auckland southwards; var. *b* from the North Cape to Hawke's Bay and Taranaki. Sea-level to 2000 ft. *Horoeka*; *Hohoeaka*; *Lancewood*. February–April.

Remarkable for its singularly protean foliage. For a detailed account reference should be made to Kirk's "Forest Flora," pp. 59 to 62; and to a paper by the same botanist in the "Transactions of the New Zealand Institute," vol. x. app. xxxi.

5. **P. ferox**, *T. Kirk, Forest Fl.* 35, t. 23, 24, 25, 26.—A small slender tree 12–20 ft. high; trunk 6–12 in. diam. Leaves very variable, but always simple; of seedlings narrow linear-lanceolate; of young unbranched plants deflexed, 12–18 in. long, $\frac{1}{2}$ –1 in. wide, narrow-linear, slightly enlarged at the tip, gradually narrowed into a short stout petiole, excessively thick and coriaceous, rigid, coarsely and irregularly lobulate-dentate; teeth large, acute, hooked, almost

spinous. Leaves of mature plants erect, 3-6 in. long, $\frac{1}{4}$ - $\frac{3}{4}$ in. broad, linear-obovate, obtuse or apiculate, gradually narrowed into a short stout petiole, very thick and coriaceous, entire or obscurely toothed near the tip. Umbels terminal; males of 6-10 slender rays bearing numerous racemose flowers; females of much shorter rays ending in 2-4-flowered umbellules. Stamens usually 4. Ovary 5-celled; styles 5, short, connate into a column. Fruit broadly oblong, large, $\frac{1}{3}$ in. diam.—*Students' Fl.* 222. *Panax ferox*, *Kirk in Trans. N.Z. Inst.* x. (1878) app. xxxiv. *P. crassifolium*, *Buch. l.c.* ix. (1877) 529, t. 20 (*not Dcne. and Planch.*).

NORTH ISLAND: Between Whangape and Hokianga, *Kirk!* East Cape, *Bishop Williams*. SOUTH ISLAND: Nelson—Wairoa, *Hector and Kirk!* Moutere and Matukituki, *Kirk!* Motueka Valley, *T. F. C.* Canterbury—Lake Forsyth, *Kirk!* Otago—Dunedin, *Buchanan!* *Petrie!* Otepopo and Lake Wakatipu, *Petrie!* Sea-level to 1500 ft.

Easily distinguished from *P. crassifolium* by the large and broad-hooked teeth of the deflexed leaves, by the slender racemes of the male flowers, and by the large fruit.

6. *P. chathamicum*, *T. Kirk, Students' Fl.* 223.—A small tree 20-25 ft. high; branches stout. Leaves dimorphic, always simple; of young unbranched plants never deflexed, 2-6 in. long, $\frac{3}{4}$ -1 $\frac{1}{4}$ in. broad, lanceolate to oblong-lanceolate, acute, coarsely or finely toothed towards the tip, membranous or slightly coriaceous; of mature plants 5-8 in. long, linear-obovate or oblanceolate, subacute obtuse or truncate at the apex, gradually narrowed into a short winged petiole, obscurely sinuate-dentate or with 2-3 coarse teeth near the apex. Umbels terminal: male very large, of 6-10 primary rays, each with 5-8 slender secondary ones 2-3 in. long, carrying crowded racemose flowers often mixed with small umbellules: female umbels smaller; rays 3-7, slender, 2-4 in. long, terminating in 6-10-flowered umbellules, with or without a few scattered flowers below. Stamens usually 4. Ovary 5-celled; styles 5, connate into a short truncate column. Fruit nearly globose, large, $\frac{1}{3}$ in. diam., 5-celled, 5-seeded.

CHATHAM ISLANDS: *Enys!* *Cox!* *Hoho.* February.

I have seen but few specimens of this, and have consequently availed myself largely of *Kirk's* description. The absence of deflexed leaves in the young state, the larger and broader leaves of the mature plant, and the large globose fruit at once separate it from *P. crassifolium* and *P. ferox*.

ORDER XXXV. CORNACEÆ.

Trees or shrubs. Leaves opposite or alternate, usually entire; stipules wanting. Flowers generally small, regular, hermaphrodite or unisexual, in axillary or terminal cymes, panicles, or heads. Calyx-tube adnate to the ovary, limb 4-5-toothed or wanting. Petals 4-5 or wanting, inserted round the margin of an epigynous disc, valvate or imbricate. Stamens inserted with the petals and

equal to them in number, rarely twice as many. Ovary inferior, 1-4-celled, crowned by a fleshy disc; style single (3 in *Griselinia*), long or short; ovules solitary (rarely 2-3), pendulous from the top of the cell, anatropous. Fruit usually drupaceous, indehiscent, 1-4-celled, or rarely with 2 pyrenes. Seed pendulous, testa thin; albumen copious, fleshy; embryo axile, radicle superior.

A small order, scattered over the whole world, but chiefly found in the north temperate zone. Genera 12; species 75. Properties unimportant. Of the 2 New Zealand genera, *Corokia* is endemic; *Griselinia* extends to South America.

Hermaphrodite. Leaves narrow, silky-tomentose below .. 1. COROKIA.
 Diœcious. Leaves broad, glabrous 2. GRISELINIA.

1. COROKIA, A. Cunn.

Evergreen shrubs; branches straight or tortuous; bark black. Leaves alternate or fascicled, petiolate, entire. Flowers small, hermaphrodite, yellow, in axillary or terminal panicles, racemes, or fascicles. Calyx-tube turbinate; limb 5-lobed, valvate. Petals 5, valvate, furnished with a small scale at the base, silky outside. Stamens 5. Ovary 1-2-celled; style short; stigma almost capitate, 2-lobed. Drupe ovoid or broadly oblong, crowned by the persistent calyx-limb, 1-2-celled; seeds 1 in each cell.

A small genus of 3 species, confined to the New Zealand area.

Leaves lanceolate. Flowers in terminal panicles .. 1. *C. buddleoides*.
 Leaves oblong-lanceolate. Flowers in axillary racemes .. 2. *C. macrocarpa*.
 Leaves orbicular or obovate, narrowed into short flat petioles. Flowers in few-flowered fascicles or solitary .. 3. *C. Cotoneaster*.

1. *C. buddleoides*, A. Cunn. *Precur.* n. 579.—An erect much-branched slender shrub 6-12 ft. high; young branchlets, under-surface of leaves, and inflorescence densely clothed with silvery-white tomentum. Leaves alternate, shortly petioled, 3-6 in. long, lanceolate or linear-lanceolate, acute or acuminate, coriaceous, dark-green and shining above; veins reticulated. Panicles terminal, leafy at the base. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., yellow. Petals oblong-lanceolate. Drupe oblong, $\frac{1}{4}$ in. long, dark-red.—*Hook. Ic. Plant.* t. 424; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 98; *Handb. N.Z. Fl.* 106; *Kirk, Students' Fl.* 224.

NORTH ISLAND: Not uncommon in woods from the North Cape as far south as the East Cape. Sea-level to 3000 ft. *Korokia-taranga*. November-December.

2. *C. macrocarpa*, T. Kirk, *Students' Fl.* 224.—An erect shrub 15-20 ft. high; branches stout, spreading; branchlets, leaves beneath, and branches of the inflorescence densely covered with silvery-white tomentum. Leaves alternate, 2-4 in. long, oblong-lanceolate to elliptic-oblong, acute or apiculate, rarely obtuse, coriaceous, gradually narrowed into rather short petioles. Flowers $\frac{1}{3}$ in. diam., yellow, in axillary racemes shorter than the leaves;

pedicels short. Petals lanceolate, acute. Drupe $\frac{1}{3}$ in. long, broadly oblong, dark-red.—*C. buddleoides* var. *b*, *Hook. f. Fl. Nov. Zel.* i. 98; *Handb. N.Z. Fl.* 106; *F. Muell. Veg. Chath. Is.* 16.

CHATHAM ISLANDS: *Dieffenbach, H. H. Travers! Captain G. Mair! Cox! Whakataka; Hokotaka.*

Closely allied to *C. buddleoides*, but amply distinct in the broader leaves, axillary racemose flowers, and larger fruit.

3. *C. Cotoneaster*, *Raoul, Choix*, 22, t. 20.—A rigid densely branched shrub 4–8 ft. high; branches tortuous and interlaced; bark black; branchlets, under-surface of leaves, and inflorescence clothed with appressed silvery-white tomentum. Leaves alternate or in alternate fascicles, $\frac{1}{3}$ –1 in. long; blade orbicular to obovate or oblong-ovate, obtuse or emarginate, coriaceous, shining above, suddenly narrowed into a broad flat petiole. Flowers small, axillary and terminal, solitary or 2–4 together; pedicels short, bracteolate. Petals narrow linear-oblong, acute. Drupe globose, $\frac{1}{4}$ in. diam., red.—*Hook. f. Fl. Nov. Zel.* i. 98; *Handb. N.Z. Fl.* 106; *Kirk, Students' Fl.* 224.

NORTH AND SOUTH ISLANDS: Not uncommon from the North Cape to Foveaux Strait. Sea-level to 2500 ft. November–January.

What may prove to be a fourth species of *Corokia* has been collected by myself at Spirits Bay, in the North Cape district. It is a twiggly bush 6–12 ft. high, with slender branches, not tortuous. Leaves alternate, $\frac{1}{2}$ –1½ in. long, narrow linear-obovate or oblanceolate, narrowed into very short petioles. Flowers and fruit not seen.

2. *GRISELINIA*, Forst.

Shrubs or trees; branches terete or angled, transversely scarred at the nodes. Leaves alternate, often unequal at the base, broad, very coriaceous; petiole dilated into a short sheath, jointed on the branch. Flowers small, diœcious, in glabrous or pubescent panicles or racemes; pedicels jointed. Male flowers: Calyx minute, 5-toothed. Petals 5, imbricate. Stamens 5. Disc fleshy, pentagonal. Females: Calyx-tube ovoid or turbinate, limb 5-toothed. Petals valvate or wanting. Rudimentary stamens wanting. Ovary 1–2-celled; styles 3, very short, subulate, recurved; ovules solitary in each cell. Fruit a 1- or rarely 2-celled berry, 1-seeded; seed oblong, testa membranous.

A small genus of 6 species, 4 of which are natives of Chili, the remaining 2 endemic in New Zealand. The Chinese and Japanese genus *Aucuba* is very closely allied.

Leaves large, 3–7 in., very unequal at the base. Petals wanting in the female flowers

1. *G. lucida*.

Leaves smaller, 1½–4 in. long, not very unequal at the base.

Petals present in both male and female flowers

2. *G. littoralis*.

1. *G. lucida*, *Forst. Prodr.* n. 401.—A stout branching shrub or small tree 3–25 ft. high, often growing on rocks or epiphytic on the branches of tall forest trees; bark thick, furrowed. Leaves 3–7 in.

long, obliquely ovate or oblong, rounded at the tip, very unequal-sided at the base, bright yellow-green, glossy, very thick and leathery; petiole short, stout. Panicles axillary or subterminal, much branched, 3-6 in. long; rhachis and pedicels pubescent. Flowers minute, greenish; females apetalous. Berry $\frac{1}{3}$ in. long, fleshy, dark-purple, usually 1-celled. Seed solitary.—*A. Cunn. Precur.* n. 639; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 98; *Handb. N.Z. Fl.* 105; *Kirk, Forest Fl.* t. 41; *Students' Fl.* 225. *Scopolia lucida*, *Forst. Char. Gen.* t. 70.

NORTH AND SOUTH ISLANDS: Not uncommon in woods from the North Cape to the Bluff. *Puka.* October–November.

2. *G. littoralis*, *Raoul, Choix*, 22, t. 19.—A round-headed tree 30–50 ft. high; trunk short, irregular, gnarled or twisted, 2–5 ft. diam.; bark rough, furrowed. Leaves 1–4 in. long, ovate or oblong-ovate, rounded at the tip, less unequal-sided at the base than in *G. lucida* and sometimes almost symmetrical, pale yellowish-green, thick and coriaceous, veins obscure; petiole rather slender, $\frac{1}{2}$ –1 in. long. Panicles axillary, 1–3 in. long, smaller than in *G. lucida* and sometimes reduced to a simple raceme; rhachis and pedicels pubescent. Flowers minute; both male and female with petals. Berry $\frac{1}{4}$ in. long, oblong. Seed solitary.—*Hook. f. Handb. N.Z. Fl.* 105; *Kirk, Forest Fl.* t. 42; *Students' Fl.* 225. *Pukateria littoralis*, *Raoul in Ann. Sci. Nat. Ser.* iii. 2 (1844) 120.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Mount Tutamoe (Northern Wairoa) and the Little Barrier Island southwards, but rare and local to the north of the East Cape; abundant in the South Island. Sea-level to 3500 ft. *Kapuka*; *Papaumu*; *Broad-leaf.* October–November.

Timber strong, close-grained and durable; frequently used for house-blocks, fencing-posts, &c.

ORDER XXXVI. CAPRIFOLIACEÆ.

Erect or climbing shrubs or small trees, rarely herbs. Leaves opposite, seldom alternate, simple or rarely pinnate, usually exstipulate. Flowers hermaphrodite, regular or irregular. Calyx-tube adnate to the ovary; limb 3–5-toothed or -lobed. Corolla gamopetalous, epigynous, rotate or funnel-shaped or tubular; limb often irregular or 2-lipped; lobes 4–5, imbricate, rarely valvate. Stamens 4–5, inserted on the tube of the corolla and alternating with its lobes, equal or unequal. Ovary inferior, 2–5-celled (rarely 1-celled), usually crowned with an epigynous disc; style long with a capitate stigma, or short and 2–5-lobed; ovules 1 or more in each cell, pendulous, anatropous. Fruit usually a berry or drupe, rarely a capsule, 1- or many-seeded. Seeds with copious albumen; embryo usually minute, radicle superior.

A small order, comprising 14 genera and about 200 species, mostly natives of the Northern Hemisphere, with few tropical or southern representatives. The order is of little economical importance, but many of the species are cultivated in gardens for the beauty or fragrance of their flowers, as the various kinds of honeysuckles and woodbines, &c. The single New Zealand genus is endemic.

1. **ALSEUOSMIA**, A. Cunn.

Evergreen shrubs, usually of small size; branchlets slender. Leaves alternate, petioled, entire or toothed, very variable in shape, coriaceous or almost membranous; stipules wanting. Flowers axillary, solitary or fascicled, very sweet-scented; pedicels bracteolate at the base. Calyx-tube ovoid; limb deeply 4-5-lobed, deciduous. Corolla tubular or funnel-shaped; tube long, equal at the base; limb of 4-5 spreading lobes; margin of lobes inflexed, toothed or lobulate. Stamens 4-5, inserted near the mouth of the corolla; filaments short; anthers oblong. Ovary 2-celled; style filiform; stigma clavate; ovules numerous in each cell, in a double row on axile placentas. Berry ovoid or oblong, 2-celled, crimson. Seeds several in each cell, angular; testa bony.

A small genus of four species, confined to New Zealand, and differing from the rest of the order in the alternate leaves. The species are exceedingly variable and difficult of discrimination.

Leaves large, 3-7 in.	Flowers 1-1½ in. long, usually 5-merous	1. <i>A. macrophylla</i> .
Leaves 1-4 in., ovate-oblong to linear-oblong.	Flowers ½-¾ in., usually 4-merous	2. <i>A. quercifolia</i> .
Leaves ½-2 in., orbicular to obovate-oblong.	Flowers ½-¾ in.	3. <i>A. Banksii</i> .
Leaves ½-3 in., narrow-linear to lanceolate.	Flowers ½-¾ in.	4. <i>A. linariifolia</i> .

1. ***A. macrophylla***, A. Cunn. *Precur.* n. 494.—A perfectly glabrous much-branched shrub 4-8 ft. high. Leaves 3-7 in. long, obovate or obovate-lanceolate to linear-oblong, obtuse or subacute, narrowed into a short stout petiole, remotely sinuate-dentate or nearly entire, rather coriaceous. Flowers solitary or in fascicles of 2-4, large, 1-1½ in. long, bright-crimson. Calyx-lobes lanceolate, acute. Corolla-lobes 5, rarely 4, margins fimbriate or toothed. Berry oblong, crimson, ⅓-½ in. long.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 102, t. 23; *Handb. N.Z. Fl.* 109; *Kirk, Students' Fl.* 227.

NORTH ISLAND: Abundant in woods from the North Cape to the East Cape, rare and local further south. **SOUTH ISLAND:** Apparently very rare. Marlborough, *J. Rutland*! Collingwood, *Dall*! Kelly's Creek, Westland, *Cockayne*! Sea-level to 3200 ft. September-November.

A very beautiful and exceedingly fragrant plant, well worthy of general cultivation. It is easily distinguished from all the other species by the large flowers.

2. ***A. quercifolia***, A. Cunn. *Precur.* n. 493.—A small slender sparingly branched shrub 1-5 ft. high. Leaves excessively variable in size and shape, 1-5 in. long, ovate-oblong, elliptic-oblong, obovate-lanceolate, or linear-oblong, obtuse or acute, narrowed into

a short slender petiole, entire or sinuate-dentate or deeply sinuate-lobed, almost membranous, sometimes glaucous below. Flowers solitary or in fascicles of 2-5, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, very slender. Calyx-lobes triangular, acute. Corolla with a crimson tube and 4-5 greenish or reddish-green acute lobes. Berry $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., broadly oblong, red.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 102; *Handb. N.Z. Fl.* 109; *Kirk, Students' Fl.* 227. *A. ilex*, *A. Cunn. Precur.* n. 492. *A. pusilla*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 241.

NORTH ISLAND: From Mongonui and Kaitaia southwards, but often local. SOUTH ISLAND: Marlborough—Rai Valley, *Rutland*; Pelorus Sound, *MacMahon*; Mount Stokes, *Kirk*. Sea-level to 2500 ft. September–November.

A very variable plant, which in some of its forms comes very near to both *A. Banksii* and *A. linariifolia*. Mr. Colenso's *A. pusilla* only differs in its rather smaller size.

3. *A. Banksii*, *A. Cunn. Precur.* n. 489.—A small slender shrub 1-4 ft. high; branches spreading, younger ones pubescent. Leaves $\frac{1}{2}$ –2 in. long, very variable in shape, broadly ovate or orbicular to obovate-oblong or obcuneate, narrowed into a rather long petiole, entire or coarsely toothed or lobed, especially towards the upper part of the leaf. Flowers solitary or 2-3 together, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, greenish-yellow, rarely reddish. Berry $\frac{1}{3}$ in. diam., globose; seeds few, 4-8.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 102, t. 24; *Handb. N.Z. Fl.* 110; *Kirk, Students' Fl.* 227. *A. atriplicifolia* and *A. palæiformis*, *A. Cunn. Precur.* n. 491, 490.

NORTH ISLAND: From Mongonui and Kaitaia southwards to the Auckland Isthmus, but often rare and local. September–November.

4. *A. linariifolia*, *A. Cunn. Precur.* n. 487.—An erect much-branched shrub 1-4 ft. high, with slender pubescent branches. Leaves numerous, crowded, $\frac{1}{2}$ –3 in. long, $\frac{1}{16}$ – $\frac{1}{2}$ in. wide, linear to linear-lanceolate or lanceolate, acute or subacute, gradually narrowed into a short petiole, quite entire or sinuate-toothed or lobed, rather membranous. Flowers solitary or in fascicles of 2-5, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, greenish-yellow, rarely reddish. Corolla-lobes 4, toothed and fimbriate. Berry broadly ovoid or turbinate; seeds few.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 103, t. 25; *Handb. N.Z. Fl.* 110; *Kirk, Students' Fl.* 227. *A. ligustrifolia*, *A. Cunn. Precur.* n. 488. *A. Hookeria*, *Col. Excur. North Is.* 84.

NORTH ISLAND: From Mongonui and Kaitaia southwards to the Manukau Harbour, not uncommon. September–November.

A very variable plant. Small forms, with narrow-linear leaves, have much of the habit and appearance of *Pittosporum reflexum*; larger states (*A. ligustrifolia*, *A. Cunn.*), with lanceolate or oblong-lanceolate leaves, approach *A. quercifolia* very closely.

ORDER XXXVII. **RUBIACEÆ.**

Trees, shrubs, or herbs, rarely climbing. Leaves opposite or whorled, simple, entire or very rarely toothed or lobed. Stipules always present, usually interpetiolar, either free or united with the petioles into a sheath, or connate into a sheath or ring surrounding the stem within the petioles; in the tribe *Galieæ* resembling the leaves, and with them forming a whorl round the branch. Flowers regular, hermaphrodite or unisexual, variously arranged. Calyx-tube adnate to the ovary; limb 4-5-toothed or cupular, sometimes wanting. Corolla gamopetalous, tubular, funnel-shaped, campanulate, or rotate, usually 4-5-lobed; lobes valvate or imbricate or contorted. Stamens inserted on the tube or mouth of the corolla, equal in number to its lobes. Ovary inferior, 2-many-celled, crowned by a fleshy disc; styles 1 or 2 or more; ovules solitary or 2 or more in each cell. Fruit very various, a drupe or berry or capsule, or composed of dehiscent or indehiscent cocci. Seeds with fleshy or horny albumen; embryo straight or curved; radicle superior or inferior.

One of the largest and best-defined orders in the vegetable kingdom, containing more than 350 genera and 4000 species. With the exception of the tribe *Galieæ*, which is almost entirely temperate, the species are mainly tropical or subtropical, and are especially plentiful in the warmer portions of South America. The medicinal properties of the order are most important. Out of many excellent drugs yielded by it, quinine and ipecacuanha are the best known and the most valuable. Among the species used for food the most noteworthy is the coffee-plant, which is now cultivated in all warm countries, and is of immense commercial importance. Many ornamental plants belong to the order, the various kinds of *Bouvardia*, *Gardenia*, *Ixora*, &c., being well-known examples. Of the 4 New Zealand genera, *Coprosma* extends to Australia and Tasmania, the Pacific Islands, New Guinea, and the mountains of Borneo. *Nertera* has the same distribution, and is found in South America as well. The two remaining genera are widely distributed in the north temperate zone.

* Leaves opposite; stipules interpetiolar. Ovary 2-celled; ovules solitary in each cell. Fruit a drupe.

Shrubs or small trees. Flowers unisexual	..	..	1. COPROSMA.
Slender herbs. Flowers hermaphrodite ..	..	..	2. NERTEA.

** Leaves whorled; stipules apparently wanting. (In reality the whorl consists of two opposite leaves and several leaf-like stipules). Ovary 2-celled; ovules solitary in each cell. Fruit of 2 dry indehiscent cocci. Herbs.

Calyx-limb wanting. Corolla rotate	..	..	..	3. GALIUM.
Calyx-limb wanting. Corolla funnel-shaped or campanulate	..	..	..	4. ASPERULA.

1. **COPROSMA**, Forst.

Shrubs or small trees, usually erect, more rarely prostrate or creeping, often fœtid when bruised. Leaves opposite, petiolate or almost sessile; stipules interpetiolar, acute or acuminate, entire or denticulate. Flowers diœcious, small and inconspicuous, solitary or clustered in few- or many-flowered fascicles or cymes. Calyx-

limb 4-5-toothed or -lobed or almost truncate, often absent in the males. Corolla funnel-shaped or campanulate, 4-5-lobed or -partite; lobes valvate in the bud. Stamens usually 4 or 5, inserted at the base of the corolla-tube; filaments long, filiform; anthers exserted, pendulous. Ovary 2-celled, rarely 3- or 4-celled; styles the same number as the cells, free to the base, filiform, far-exserted, papillose-hirsute; ovules solitary in each cell. Fruit a fleshy oblong or ovoid or globose drupe, with 2 (rarely 4) 1-seeded plano-convex pyrenes.

A genus of about 60 species, having its headquarters in New Zealand; found also in Australia and Tasmania and northwards to New Guinea and Borneo; also stretching through Polynesia as far as the Sandwich Islands and Juan Fernandez. In New Zealand it everywhere forms a large proportion of the shrubby vegetation, and is equally plentiful in lowland forests or subalpine woods, often forming dense and sometimes almost impenetrable thickets. One species ascends the mountains to a height of 6000 ft., and reaches as far south as Macquarie Island, where it is the sole ligneous plant. The species are extremely variable in habit, foliage, and vegetative characters generally; and, as the flowers are small and inconspicuous and very uniform in structure throughout the genus, it is no easy matter to obtain good distinctive characters, even when dealing with fresh specimens. In the following account I have adhered to the plan adopted in my monograph of the New Zealand species, published in the "Transactions of the New Zealand Institute" (Vol. xix., pp. 218 to 252), to which reference should be made for many details which cannot be given here.

In attempting to determine the species of *Coprosma* really good and well-selected specimens showing both foliage and flowers are indispensable. Both sexes should be collected; and, as important characters are often afforded by the fruit, it should be obtained also, if possible from the same plant from which the female flowers were taken, notes being preserved of the shape, size, colour, and other characters lost in drying. Notes should also be kept of the habit and mode of growth, some of the closely allied species being easily distinguished by that alone. As the characters on which the species are founded are to a great extent comparative, the student must not expect to make much progress until he has collected a considerable number of the species and carefully compared one with another. The small-leaved species included in section B are particularly difficult to identify until most of them have been studied in detail.

In many of the small-leaved species the flowers are closely invested by one or more series of connate bracts, each series being composed of a pair of minute depauperated leaves and their stipules. The upper series usually forms an unequally 4-toothed cup-shaped involucre, and is easily mistaken for a calyx, especially in the male flowers, where the true calyx is often entirely wanting.

It is perhaps necessary to state that, with one or two exceptions, I have examined authentic specimens in Mr. Colenso's herbarium of the 16 species described by him in various volumes of the "Transactions of the New Zealand Institute." They are for the most part absolutely identical with previously described species, and the remainder differ so very slightly that they cannot be separated even as varieties.

A. Erect shrubs or trees. Leaves large, over 1 in. in length. Flowers fascicled on lateral peduncles; fascicles usually many-flowered.

* Peduncles 1-3 in. long (short in *C. macrocarpa*), trichotomously divided; fascicles dense.

Leaves 3-7 in. long, coriaceous. Peduncles 1-1½ in. Fruit

very large, ½-¾ in. long

Leaves 4-9 in., membranous. Peduncles 1-3 in. Fruit ½ in.

Leaves 2-5 in., coriaceous. Peduncles 1-2 in. Fruit ⅓ in.

1. *C. macrocarpa*.

2. *C. grandifolia*.

3. *C. lucida*.

** Peduncles short, seldom over 1 in. Fascicles dense, many-flowered, rarely few-flowered.

Subalpine dwarf shrub. Leaves very coriaceous, serrulate.

Fascicles small, 2-5-flowered 4. *C. serrulata*.

Maritime shrub. Branchlets glabrous or nearly so.

Leaves fleshy, bright-green; margins recurved .. 5. *C. Baueri*.

Tree 15-40 ft. Branchlets coarsely pubescent. Leaves

$\frac{1}{2}$ -3 in., oblong or obovate 6. *C. chathamica*.

Maritime shrub. Branchlets finely pubescent. Leaves

1-2 in., subcoriaceous, oblong, obtuse; margins flat .. 7. *C. petiolata*.

Leaves 2-5 in., elliptic-oblong, acute, firm, coriaceous.

Drupe orange 8. *C. robusta*.

Leaves $\frac{1}{2}$ -2 in., linear or lanceolate, coriaceous. Drupe

pale and translucent 9. *C. Cunninghamii*

Leaves $\frac{1}{2}$ -3 in., ovate-lanceolate to elliptic-ovate, acumi-

nate, membranous, glabrous. Inflorescence lax .. 10. *C. acutifolia*.

Leaves $\frac{1}{2}$ -4 in., ovate-lanceolate to ovate, acuminate,

membranous; petioles and midribs hairy. Inflorescence

dense 11. *C. tenuifolia*.

Tree 15-30 ft. Leaves ovate- or orbicular-spathulate, nar-

rowed into winged petioles 12. *C. arborea*.

B. Erect or rarely prostrate shrubs. Leaves small, less than 1 in. Flowers solitary or in few-flowered fascicles on minute arrested branchlets, which are often so much reduced that the flowers appear to be axillary.

* Twigs glabrate or puberulous. Leaves spathulate. Drupe globose, black.

Leaves suddenly contracted into a narrow winged petiole

longer than the blade 13. *C. spathulata*.

** Twigs densely pubescent (except in *C. tenuicaulis*). Leaves orbicular, orbicular-spathulate, or broadly oblong (often narrow in *C. rhamnoides*). Drupe globose, black or red.

Branches divaricating. Leaves $\frac{1}{2}$ -1 in., orbicular, cuspi-

date, membranous. Drupe often didymous, $\frac{1}{8}$ in. diam., red 14. *C. rotundifolia*.

Branches fastigiate. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., orbicular-spathulate,

acute, membranous. Drupe $\frac{1}{8}$ in. diam., black or nearly

so 15. *C. areolata*.

Branches spreading. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., orbicular-spathulate,

obtuse, rather coriaceous. Drupe $\frac{1}{8}$ in. diam., black .. 16. *C. tenuicaulis*.

Branches spreading, often interlaced. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in.,

variable, orbicular to ovate-oblong or linear-oblong.

Drupe $\frac{1}{8}$ in. diam., red 17. *C. rhamnoides*.

*** Twigs densely pubescent (except in *C. ramulosa*). Leaves oblong linear-oblong, or linear-obovate. Drupe globose.

Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong to obovate, densely ciliate .. 18. *C. ciliata*.

Erect, leafy. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., obovate or linear-obovate.

Drupe $\frac{1}{8}$ in. diam., bluish or bluish-violet to black .. 19. *C. parviflora*.

Prostrate or decumbent, glabrate. Leaves $\frac{1}{2}$ in., linear-

obovate. Drupe $\frac{1}{8}$ in. diam., red 20. *C. ramulosa*.

*** Twigs nearly glabrous. Leaves orbicular to oblong or obovate (spathulate in *C. virescens*). Drupe oblong, rarely obovoid, usually yellow.

Branches ascending, puberulous. Leaves $\frac{1}{2}$ -1 in. long,

obovate or oblong-ovate, coriaceous 21. *C. Buchanani*.

- Branches rigid and interlacing. Leaves $\frac{1}{3}$ – $\frac{2}{3}$ in., orbicular or broad-oblong, very coriaceous. Drupe $\frac{1}{4}$ in. long, broadly oblong 22. *C. crassifolia*.
- Branches spreading, often interlaced. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in., obovate or oblong-spathulate, subcoriaceous. Drupe $\frac{1}{4}$ – $\frac{1}{3}$ in., oblong or obovoid 23. *C. rigida*.
- Branches spreading, interlaced. Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in., oblong or linear-oblong, coriaceous. Drupe $\frac{1}{8}$ in. diam., obconic or obcordate 24. *C. obconica*.
- Branches spreading. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in., orbicular or broadly oblong, membranous. Drupe $\frac{1}{4}$ in. long, yellowish-white 25. *C. rubra*.
- Branches slender, interlacing. Leaves $\frac{1}{5}$ – $\frac{1}{3}$ in., ovate-spathulate, thin. Drupe $\frac{1}{4}$ in. long, yellowish-white 26. *C. virescens*.
- **** Twigs pubescent or puberulous. Leaves linear or narrow-linear-oblong. Drupe variable.
- Prostrate; branches flexuous and interlacing. Leaves narrow-linear, $\frac{1}{4}$ – $\frac{1}{3}$ in., $\frac{2}{10}$ in. wide. Drupe globose, pale-blue 27. *C. acerosa*.
- Tall, erect; branches spreading. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear or linear-oblong. Drupe oblong, $\frac{1}{3}$ in. long, bluish 28. *C. propinqua*.
- Procumbent or suberect. Leaves usually fascicled, $\frac{1}{2}$ –1 in. long, linear, linear-oblong, or linear-obovate 29. *C. Kirkii*.
- C. Erect or rarely prostrate shrubs. Leaves small, less than 1 in. long (except in C. foetidissima and occasionally in C. linariifolia). Flowers terminating leafy branchlets, always solitary (except the males in C. linariifolia and sometimes in C. foetidissima).*
- Erect, slender, glabrate, 6–15 ft. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ in., linear-lanceolate; stipules long, sheathing. Male flowers in 3–5-flowered fascicles 30. *C. linariifolia*.
- Erect; branches stout, setose. Leaves $\frac{1}{3}$ in., linear-lanceolate, ciliate 31. *C. Solandri*.
- Erect, slender, 6–15 ft., intensely foetid when bruised. Leaves $\frac{1}{2}$ –2 in., oblong or obovate, membranous. Male flowers sometimes fascicled 32. *C. foetidissima*.
- Erect or procumbent, 2–8 ft., not foetid. Leaves $\frac{1}{3}$ –1 in., linear-obovate or linear-oblong. Flowers solitary on decurved peduncles 33. *C. Colensoi*.
- Prostrate, foetid when bruised. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in., linear-obovate, retuse or emarginate, coriaceous; margins minutely crenulate 34. *C. retusa*.
- Erect, rigid, densely branched. Leaves numerous, $\frac{1}{5}$ – $\frac{3}{4}$ in., linear- or oblong-obovate, coriaceous, spreading or recurved 35. *C. cuneata*.
- Erect; branches very slender. Leaves $\frac{1}{4}$ – $\frac{1}{3}$ in., linear-lanceolate, flat, thin 36. *C. microcarpa*.
- Prostrate or procumbent. Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in., linear-lanceolate, concave, coriaceous 37. *C. depressa*.
- D. Stems short, prostrate and rooting, often densely matted. Leaves small. Flowers terminal, solitary.*
- Leaves glabrous, linear-oblong to rounded-oblong or obovate. Male corolla large, curved, tubular. Drupe $\frac{1}{4}$ in. diam. 38. *C. repens*.
- Leaves hairy, linear-oblong or linear-obovate. Male corolla smaller, campanulate above. Drupe $\frac{1}{5}$ – $\frac{1}{2}$ in. diam. 39. *C. Petriei*.

1. **C. macrocarpa**, *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 147. — A robust leafy glossy-green shrub 5–12 ft. high, quite glabrous in all its parts; bark greyish-brown. Leaves large, 3–7 in. long, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. broad, ovate-oblong or elliptic-oblong, obtuse or acute or apiculate, rather suddenly narrowed into a short stout petiole, coriaceous; margins slightly thickened; veins conspicuous, reticulated. Stipules large, on the young leafy shoots often sheathing the branch for some distance. Flowers not seen. Fruit much the largest of the genus, in fascicles of 3–7 on very short axillary peduncles, $\frac{1}{2}$ –1 in. long, broadly ovoid or oblong or sometimes nearly orbicular; not seen perfectly ripe.—*Kirk, Students' Fl.* 230.

NORTH ISLAND: Hitherto only found on the Three Kings Islands, to the north-west of Cape Maria van Diemen, *T. F. C.*

At once distinguished by the large fruit, which is more than twice the size of that of *C. grandifolia*, which is its nearest ally. The leaves are almost as large as those of *C. grandifolia*, but approach *C. robusta* in shape and texture, and dry a brownish-black as in that species.

2. **C. grandifolia**, *Hook. f. Fl. Nov. Zel.* i. 104.—A large sparingly branched shrub 8–15 ft. high, with dark-brown bark. Leaves large, 4–9 in. long, obovate-oblong or elliptic-oblong, rarely narrower and elliptic-lanceolate, acute or acuminate, membranous, dull-green, not shining nor glossy; veins finely reticulated; petioles rather slender, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long. Peduncles 1–3 in. long, trichotomously divided. Flowers in fascicles at the ends of the divisions of the peduncle; male fascicles much more dense than the females. Calyx distinct in both sexes, minute, 4–5-toothed. Male corolla $\frac{1}{3}$ in. long, funnel-shaped; female smaller, $\frac{1}{5}$ – $\frac{1}{4}$ in., tubular. Drupe about $\frac{1}{3}$ in. long, oblong, obtuse, reddish-orange.—*Handb. N.Z. Fl.* 112; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 229; *Kirk, Students' Fl.* 231. *C. autumnalis*, *Col. in Trans. N.Z. Inst.* xix. (1887) 263. *Ronabea australis*, *A. Rich. Fl. Nouv. Zel.* 265.

NORTH AND SOUTH ISLANDS: Abundant from the Three Kings Islands and the North Cape to Marlborough and the south-west of Nelson Province. Sea-level to 2500 ft. *Kānono*; *Mānono*. April–June.

One of the most distinct species of the genus, easily recognised by the large membranous leaves and well-developed inflorescence.

3. **C. lucida**, *Forst. Prodr.* n. 137.—A stout leafy glabrous shrub 4–15 ft. high. Leaves 2–5 in. long, obovate to oblong-obovate or obovate-lanceolate, obtuse or acute or apiculate, gradually narrowed into a short stout petiole, coriaceous, shining, yellow-green when dry. Peduncles 1–2 in. long, trichotomously divided. Flowers numerous, in fascicles at the ends of the divisions of the peduncle. Calyx present in both sexes, minutely 4–5-toothed. Male corolla $\frac{1}{5}$ in. long, broadly tubular; female shorter and narrower. Drupe $\frac{1}{3}$ – $\frac{1}{2}$ in. long, oblong or oblong-obovoid, reddish-orange.—*A. Rich.*

Fl. Nouv. Zel. 262; *A. Cunn. Precur.* n. 470; *Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 104; *Handb. N.Z. Fl.* 112; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 230; *Kirk, Students' Fl.* 231.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, ascending to 3200 ft. *Karamu.* September–November.

Allied to *C. grandifolia*, which it approaches in the inflorescence, but easily separated by the smaller coriaceous and glossy obovate leaves.

4. **C. serrulata**, *Hook. f. ex Buch. in Trans. N.Z. Inst.* iii. (1871) 212.—A robust perfectly glabrous dwarf shrub 1–4 ft. high; branches few, spreading; old bark white and papery. Leaves $\frac{3}{4}$ –2 in. long or more, oblong-obovate or broadly obovate or nearly orbicular, rounded at the apex, obtuse or apiculate, narrowed into a short broad petiole, thick and coriaceous; margins thickened, minutely serrulate. Stipules very large, triangular, with toothed or ciliated margins. Male flowers in 3–7-flowered axillary fascicles. Calyx wanting. Corolla campanulate, 4–5-lobed. Females solitary or in 2–5-flowered fascicles. Calyx-limb obscurely toothed. Corolla tubular, shortly 3–5-lobed. Drupe $\frac{1}{4}$ – $\frac{1}{3}$ in., broadly oblong, reddish.—*Cheesem. in Trans. N.Z. Inst.* xiv. (1887) 231; *Kirk, Students' Fl.* 232.

SOUTH ISLAND: Subalpine localities from Mount Arthur, Nelson, to Dusky Sound, chiefly on the western side of the mountains. Altitudinal range 2000–4500 ft. November–January.

A very distinct species, differing from all others in the serrulate leaves.

5. **C. Baueri**, *Endl. Iconog.* t. 111.—A shrub or small tree, very variable in size and mode of growth; in exposed rocky places often not more than 1–3 ft. high, with almost prostrate branches; in rich sandy soils sometimes forming a round-topped tree 15–25 ft. high. Branches stout, glabrous, or the younger ones minutely pubescent. Leaves bright shining green, almost fleshy, black when dry, 1–3 in. long, broadly ovate or oblong, obtuse or retuse; margins usually recurved. Stipules short and broad, minutely toothed. Male flowers in dense heads on short axillary peduncles. Calyx minute, cupular, obsolete 4-toothed. Corolla campanulate, $\frac{1}{4}$ – $\frac{1}{5}$ in. long, 4–5-lobed. Females in 3–6-flowered heads; peduncles shorter and more slender than in the males. Calyx-limb minute, truncate or obscurely 4-toothed. Corolla tubular, shortly 4-lobed. Drupe ovoid, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, orange-yellow.—*C. Baueriana*, *Hook. f. Fl. Nov. Zel.* i. 104; *Handb. N.Z. Fl.* 112; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 232; *Kirk, Forest Fl.* t. 62; *Students' Fl.* 231. *C. retusa*, *Hook. f. in Lond. Journ. Bot.* iii. (1844) 415 (not of Petrie). *C. lucida*, *Endl. Prodr. Fl. Ins. Norf.* 60 (non Forst.). *C. Stocki*, *Barbier in Rev. Hort. Belg.* iii. (1877) t. 12.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Common on sea-cliffs and sand-dunes as far south as Marlborough and Greymouth. *Angiangi*; *Naupata.* September–November.

Nearest to *C. robusta*, but distinguished by the more compact habit, glossy almost fleshy obtuse leaves with recurved margins, smaller heads of flowers, and rounder fruit.

Mr. Kirk's variety *oblongifolia* (Students' Fl. 232), with densely pubescent branchlets and small linear-oblong leaves, will probably prove to be a distinct species.

6. *C. chathamica*, Cockayne in Trans. N.Z. Inst. xxxiv. (1902) 317.—A tree 15–40 ft. high, with a trunk sometimes 2 ft. in diam.; bark greyish-brown; branchlets obscurely tetragonous, more or less clothed with short stiff greyish hairs. Leaves $1\frac{1}{2}$ –3 in. long, about 1 in. broad, oblong or obovate-oblong or obovate, obtuse or subacute, narrowed into a rather slender petiole, subcoriaceous, dark-green or glossy above, paler beneath, glabrous except the petioles and a few scattered hairs along the midrib and margins; veins conspicuously reticulated beneath. Male flowers not seen. Female flowers in few-flowered fascicles. Calyx-limb cupular, truncate. Corolla deeply 4-lobed. Drupe large, oblong-ovoid, rather more than $\frac{1}{2}$ in. long, yellowish-red.

CHATHAM ISLANDS: Abundant, *H. H. Travers*; *Captain G. Mair*! *Cox* and *Cockayne*!

I have only seen two very imperfect specimens of this, and the above description is mainly based upon that given by Mr. Cockayne. It was referred to *C. petiolata* by Sir J. D. Hooker (Handb., p. 731), but appears to differ in the very much larger size, the coarser almost shaggy pubescence on the young branchlets (in *C. petiolata* the pubescence is very short, fine, and even), and in the larger leaves.

7. *C. petiolata*, Hook. f. in Journ. Linn. Soc. i. (1857) 128.—A shrub or small tree 6–15 ft. high; bark pale-grey; branchlets terete or obscurely tetragonous, uniformly clothed with a fine ashy-grey pubescence. Leaves 1–2 in. long, elliptic-oblong or obovate, rounded at the apex, narrowed into a short slender petiole, subcoriaceous, glabrous or the petiole and veins beneath puberulous; margins flat or very slightly recurved. Stipules deltoid, acuminate. Male flowers in compact rounded heads on short axillary puberulous peduncles. Calyx-limb obscure. Corolla campanulate, $\frac{1}{2}$ in. long, deeply 4-lobed. Females in 3–6-flowered fascicles. Calyx cupular or obscurely toothed. Corolla tubular, 3–5-toothed. Mature fruit not seen.—*Handb. N.Z. Fl.* 113; *Kirk, Students' Fl.* 232.

KERMADEC ISLANDS: Abundant throughout the group, *McGillivray, T. F. C.*

Very closely allied to *C. Baueri*, but easily separated by the uniform grey pubescence of the branchlets, and by the smaller flat leaves with much more slender petioles. I have seen no specimens from the mainland of New Zealand, and fear that the locality of "maritime rocks south of Castlepoint," given in the "Handbook," is erroneous.

8. *C. robusta*, Raoul in Ann. Sci. Nat. Ser. iii. 2 (1844) 121.—A stout erect glossy-green shrub 5–15 ft. high, perfectly glabrous in all its parts; bark greyish-brown. Leaves numerous, $1\frac{1}{2}$ –5 in. long, elliptic-oblong to elliptic-lanceolate, acute or rarely obtuse,

narrowed into a short stout petiole, coriaceous, dark-green and shining above, paler beneath; margins sometimes slightly recurved. Peduncles short, stout, simple or branched, bearing dense many-flowered glomerules. Male flowers: Calyx minute, cupular, obsoletely 4-5-toothed or quite truncate. Corolla campanulate, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, 4-5-lobed. Females: Much smaller, $\frac{1}{5}$ – $\frac{1}{8}$ in. Corolla tubular, shortly 3-5-lobed. Drupes crowded, oblong to ovoid, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, yellowish- or reddish-orange.—*Choix de Plantes*, 23, t. 21; *Hook. f. Fl. Nov. Zel.* i. 105; *Handb. N.Z. Fl.* 113; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 234; *Kirk, Students' Fl.* 233. *C. coffæoides*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 87.

Var. *angustata*, *Kirk, l.c.*—Leaves smaller, $\frac{3}{4}$ –2 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, linear-oblong or lanceolate. Includes var. *parva*, *Kirk, l.c.*

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant throughout, ascending to 2500 ft. *Karamu*. August–October.

The most generally distributed of all the New Zealand species.

9. *C. Cunninghamii*, *Hook. f. Handb. N.Z. Fl.* 113.—A large sparingly branched shrub 6-15 ft. high; bark pale; branches ascending. Leaves erect, $\frac{1}{2}$ –2 in. long, linear or linear-lanceolate, acute or subacute, gradually narrowed into a short stout petiole, flat, coriaceous. Flowers sessile in 3-12-flowered glomerules or terminating short arrested branchlets. Males: Calyx minute, cupular, truncate or obscurely lobed. Corolla campanulate, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, 4-5-lobed. Females smaller and less numerous. Calyx-limb 4-5-toothed. Corolla tubular, 3-5-lobed. Styles very long and slender. Drupe broadly oblong, $\frac{1}{4}$ in. long, pale and translucent.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 234; *Kirk, Students' Fl.* 233. *C. foetidissima*, *A. Cunn. Precur.* n. 471 in part (*non Forst.*).

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Not uncommon in lowland districts, especially in rich alluvial soils. *Mingimingi*. August–September.

Very closely allied to *C. robusta*, but distinguished by the linear leaves, fewer flowers, and translucent fruit. Intermediate states are not uncommon, and are often difficult to place in the absence of fruit.

10. *C. acutifolia*, *Hook. f. in Journ. Linn. Soc.* i. (1857) 128.—A glabrous shrub or small tree 8-20 ft. high; bark pale; branches slender, spreading. Leaves $1\frac{1}{2}$ –4 in. long, lanceolate or ovate-lanceolate to elliptic-ovate, acuminate, narrowed into a slender petiole $\frac{1}{4}$ – $\frac{1}{2}$ in. long, thin and membranous; veins finely reticulated. Peduncles slender, longer than the petioles, simple or trichotomously divided; branches ending in little fascicles of 2 or 3 flowers. Male flowers rather large, $\frac{1}{3}$ in. long. Calyx minute, cupular. Corolla broadly funnel-shaped, 4-5-lobed. Female flowers smaller and fewer. Calyx-limb with 4-5 linear teeth. Corolla tubular, 3-5-lobed. Drupe oblong, $\frac{1}{4}$ in. long, reddish-orange.—*Handb. N.Z. Fl.* 114; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 169; *Kirk, Students' Fl.* 233.

KERMADEC ISLANDS: Abundant on Sunday or Raoul Island, ascending to the tops of the hills, alt. 1700 ft., *McGillivray, T. F. C.* July–August.

A very distinct species, at once recognised by the comparatively narrow thin and membranous leaves and lax inflorescence.

11. **C. tenuifolia**, *Cheesem. in Trans. N.Z. Inst.* xviii. (1886) 315.—A sparingly branched shrub 8–15 ft. high, glabrous, or the petioles and midribs of the young leaves minutely hairy; branches slender, terete; bark pale. Leaves $1\frac{1}{2}$ –4 in. long, ovate or oblong-ovate to ovate-lanceolate or elliptic-lanceolate, acute or acuminate, narrowed into slender petioles $\frac{1}{4}$ – $\frac{3}{4}$ in. long, thin and membranous or rarely subcoriaceous, dull brownish-green above, paler below; veins conspicuous on both surfaces, finely reticulated. Stipules rather large, broadly deltoid, margins ciliate when young. Male flowers crowded in axillary 3–8-flowered fascicles or terminating arrested branchlets. Calyx apparently wanting. Corolla campanulate, 4–5-lobed. Female flowers not seen. Fruit in dense fascicles of 3–8 on short lateral branchlets, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, ovoid or oblong.—*Kirk, Students' Fl.* 234.

NORTH ISLAND: Te Aroha, Pirongia, and Karioi Mountains, *T. F. C.*; Mount Hikurangi, *Adams and Petrie*! Lake Waikaremoana, *Bishop Williams*! *E. Best*! Ruahine Mountains, *Colenso*! Mount Egmont Ranges, *T. F. C.*; abundant in the Upper Wanganui and Rangitikei Valleys, *Kirk*! 1000–4000 ft.

Distinguished from *C. robusta* by the membranous pale-brown leaves and smaller glomerules. From *C. acutifolia* it is separated by the broader leaves with coarser venation and by the compact inflorescence.

12. **C. arborea**, *T. Kirk in Trans. N.Z. Inst.* x. (1878) 420.—A closely branched round-headed tree 15–30 ft. high; trunk 6–18 in. diam.; branchlets slender, puberulous towards the tips. Leaves 1–2½ in. long, ovate-spathulate or orbicular-spathulate, obtuse or retuse, suddenly narrowed into winged petioles $\frac{1}{4}$ – $\frac{3}{4}$ in. long, coriaceous, yellow-green above, often reddish beneath; veins reticulated; margins flat. Stipules short, deltoid, ciliate when young. Flowers densely crowded in many-flowered rounded glomerules or heads, terminating short axillary branchlets or at the ends of larger shoots. Male flowers: Calyx narrow, deeply divided into 4–5 ciliate lobes. Corolla short, $\frac{1}{2}$ in. long, campanulate, deeply 4–5-lobed. Females: Smaller and shorter, in 4–12-flowered fascicles. Calyx-limb 4–5-toothed. Corolla tubular. Drupes closely packed, broadly oblong or almost globose, $\frac{1}{4}$ in. diam., colourless and translucent.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 236; *Kirk, Forest Fl.* t. 132; *Students' Fl.* 234.

NORTH ISLAND: Not uncommon in woods from the North Cape to the Lower Waikato. Sea-level to 1500 ft. October–November.

One of the largest species of the genus, and one of the most distinct. The calyx of the male flowers is better developed and has deeper divisions than in any other species.

13. **C. spathulata**, *A. Cunn. Precur.* n. 479.—A small sparingly branched shrub 2–5 ft. high, rarely more; branches slender, young ones puberulous. Leaves rather distant, variable in size, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; blade orbicular or broadly or transversely oblong, obtuse or retuse or emarginate, suddenly contracted into a narrow winged petiole longer or shorter than the blade, coriaceous, glossy; margins recurved; veins few. Stipules triangular, cuspidate. Flowers sessile, axillary, solitary or in 2–3-flowered fascicles. Males: Seated in an involucre composed of a pair of depauperated leaves and their stipules, drooping. Calyx deeply 4–5-lobed. Corolla campanulate, $\frac{1}{2}$ in. long, 4–5-lobed to the middle, lobes revolute. Stamens usually 4. Females generally solitary, smaller and narrower than the males. Calyx-limb deeply 4-toothed, teeth acute. Corolla tubular, deeply 3–4-lobed. Drupe globose or nearly so, $\frac{1}{4}$ in. diam., black, very rarely red.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 106; *Handb. N.Z. Fl.* 114; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 237; *Kirk, Students' Fl.* 234.

NORTH ISLAND: Abundant in lowland forests from the North Cape to the Upper Waikato. August–September.

Allied to *C. arborea*, from which it is easily separated by the small size, straggling habit, smaller leaves on longer petioles, fewer flowers, and solitary black fruit. The leaves are often a bronzy colour, shining and polished on the upper surface.

14. **C. rotundifolia**, *A. Cunn. Precur.* n. 473.—A laxly branched shrub 4–12 ft. high; branches long and slender, widely spreading, irregularly and sparsely branched, the young ones densely pubescent or almost villous towards the tips; bark greyish-brown. Leaves distant, $\frac{1}{4}$ –1 in. long, usually orbicular, but varying to broadly oblong or ovate-oblong, cuspidate or abruptly acute, rarely obtuse, thin and membranous, more or less pubescent and ciliate, especially on the margins and veins, finely reticulated; petioles short, villous. Flowers sessile, in axillary few- or many-flowered fascicles, rarely solitary. Males: Calyx wanting. Corolla $\frac{1}{10}$ in. long, broadly campanulate, deeply 4-lobed. Female flowers smaller and narrower. Calyx-limb minutely 4-toothed. Corolla tubular, 3–4-lobed. Drupe globose or broader than long, often didymous, $\frac{1}{8}$ in. diam., red.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 108; *Handb. N.Z. Fl.* 114; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 237; *Kirk, Students' Fl.* 235. *C. rufescens*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 261.

NORTH AND SOUTH ISLANDS: Abundant in damp forests, by the side of rivers, &c. Sea-level to 2000 ft. September–October.

The spreading habit, broad membranous leaves, villous branchlets, small fasciated flowers, and small globose or didymous red drupes are the best marks of this common species. *C. areolata* is distinguished by its fastigate habit, smaller acute leaves, and black drupe; *C. tenuicaulis* by being more glabrous, by the much smaller leaves, and by the black drupe; while *C. rubra* is at once

separated by the nearly glabrous branchlets and oblong yellow fruit. The leaves are often blotched, and are usually more or less deciduous, so that the plant is often quite bare in spring.

15. *C. areolata*, *Cheesem. in Trans. N.Z. Inst.* xviii. (1886) 315.—An erect closely branched shrub or small tree 6–15 ft. high; branches slender, fastigiate, ultimate pubescent or villous with soft greyish hairs. Leaves $\frac{1}{3}$ – $\frac{2}{3}$ in. long, orbicular-spathulate to ovate or elliptic-spathulate, acute or apiculate, abruptly narrowed into short hairy petioles, thin and membranous, flat, glabrous or nearly so above, usually pubescent on the veins beneath; veins forming large areoles. Flowers axillary, solitary or in 2–4-flowered fascicles. Male flowers: True calyx wanting, but one or two calycine involucels closely invest the base of the corolla. Corolla broadly campanulate, $\frac{1}{8}$ in. long, deeply 4–5-lobed. Females: Solitary or 2 together, $\frac{1}{10}$ in. long. Calyx truncate or obscurely 4-toothed. Corolla narrow-funnel-shaped, shortly 4-lobed. Drupe globose, $\frac{1}{8}$ in. diam., black or nearly so when fully ripe.—*Kirk, Students' Fl.* 235. *C. multiflora*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 86.

NORTH AND SOUTH ISLANDS: Not uncommon in lowland forests throughout. Sea-level to 1500 ft. September–October.

The fastigiate habit makes this species easy of recognition. Its nearest ally is *C. tenuicaulis*, which is separated by its smaller size, spreading branches, dark-coloured bark, more glabrous leaves and branchlets, and smaller and more coriaceous leaves.

16. *C. tenuicaulis*, *Hook. f. Fl. Nov. Zel.* i. 106.—A much-branched shrub 4–8 ft. high; bark purplish-brown; branches slender, spreading, often interlaced, young ones finely puberulous. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in. long, rarely more, orbicular or ovate-spathulate, rounded at the apex, obtuse or subacute, abruptly narrowed into a short flat petiole, somewhat coriaceous, flat, glabrous on both surfaces; veins reticulated in large areoles. Flowers axillary, solitary or in 2–3-flowered fascicles, involuclate. Males: Calyx wanting. Corolla campanulate, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, 4–5-lobed. Females smaller and shorter. Calyx-limb truncate. Corolla tubular, 3–5-lobed. Drupe globose or depressed, $\frac{1}{8}$ in. diam., shining-black.—*Handb. N.Z. Fl.* 115; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 239; *Kirk, Students' Fl.* 236.

Var. *major*, *Cheesem.* — Leaves much larger and more membranous, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long; blade orbicular, suddenly narrowed into a long flat petiole often equalling the blade. Flowers and fruit apparently as in the type. Perhaps a distinct species.

NORTH ISLAND: Abundant in marshy forests or open turfy swamps from the North Cape to Hawke's Bay and Taranaki. Var. *major*: Lower Waikato, *H. Carse*! Sea-level to 1000 ft. September–October.

17. *C. rhamnoides*, *A. Cunn. Precur.* n. 474.—A small densely branched shrub 2–6 ft. high; bark reddish-brown, uneven; branches numerous, spreading, often rigid and interlaced when

growing in exposed places; young shoots more or less clothed with a short white pubescence. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{2}$ in. broad, very variable in shape and texture, orbicular or broadly ovate to narrow-oblong, in some varieties with lanceolate or linear leaves mixed with the broader ones, rounded retuse or acute, abruptly narrowed into a very short petiole, coriaceous or almost membranous, glabrous or puberulous beneath; veins reticulated, evident except in the more coriaceous forms. Flowers axillary, solitary or in 2–3-flowered fascicles, involucrellate. Males: Calyx wanting. Corolla campanulate, $\frac{1}{10}$ in. long, 4–5-lobed to below the middle, lobes often recurved. Females smaller and narrower. Calyx-limb truncate or obsoletely toothed. Corolla tubular, deeply 4-cleft; lobes narrow, revolute. Drupe globose, $\frac{1}{8}$ in. diam., usually bright-red or reddish-black, rarely quite black.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 239; *Kirk, Students' Fl.* 236. Two main forms are distinguishable as follows:—

Var. *a*, **vera**.—Leaves orbicular or broadly ovate, obtuse, often coriaceous.—*C. rhamnoides*, *A. Cunn.*; *Hook. f. Fl. Nov. Zel.* i. 107; *Handb. N.Z. Fl.* 116. *C. concinna*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 330. *C. orbiculata*, *Col. l.c.* xxii. (1890) 465.

Var. *b*, **divaricata**.—Leaves broadly ovate, oblong-ovate, or oblong, acute or subacute, rather thin. Narrower leaves, linear or lanceolate, often mixed with the broader ones.—*C. divaricata*, *A. Cunn. Precur.* n. 476 (not of *Hook. f.*). *C. heterophylla*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 263. ? *C. gracilis*, *A. Cunn. Precur.* n. 475.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, ascending to 3000 ft. August–October.

An exceedingly variable and puzzling species, for a fuller account of which reference should be made to my revision of the genus, published in the "Transactions of the New Zealand Institute," Vol. xix. (p. 239).

18. **C. ciliata**, *Hook. f. Fl. Antarct.* i. 22.—A much-branched bush 4–10 ft. high, sometimes forming almost impenetrable thickets; branches stout or slender, lax or dense, young ones villous with rather rigid hairs; bark pale, almost white. Leaves tufted on short lateral branchlets, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, oblong or oblong-obovate, rarely narrower and linear-oblong, obtuse or subacute, narrowed into a very short petiole, flat, rather membranous, under-surface slightly pubescent, margins and petiole ciliate; veins obscure, not reticulated. Stipules broad, acute, villous. Flowers unknown. Drupe (only a single specimen seen) subglobose, $\frac{1}{8}$ in. diam., black.—*Handb. N.Z. Fl.* 115; *Kirk, Students' Fl.* 237.

AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant, ascending to 1000 ft.

Apparently closely allied to *C. parviflora*, but its exact position cannot be determined until good flowering and fruiting specimens have been obtained.

19. **C. parviflora**, *Hook. f. Fl. Nov. Zel.* i. 107.—An erect much-branched leafy shrub 4–15 ft. high; branches stout or slender, often spreading in a horizontal plane; branchlets densely pubescent or

villous; bark pale-grey. Leaves usually close-set, fascicled on short lateral branchlets, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, obovate or linear-obovate or linear-oblong, rounded at the top or rarely subacute, narrowed into a short petiole, coriaceous, glabrous or the petioles and midrib pubescent; margins flat or slightly recurved; veins not conspicuous. Stipules broad, pubescent or villous. Flowers involu-cellate, solitary or in 2–4-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{10}$ in. long, broadly campanulate, 4–5-partite almost to the base. Females: Calyx-limb minutely 4–5-toothed. Corolla $\frac{1}{12}$ in., tubular, 4-lobed. Drupe globose, $\frac{1}{8}$ in. diam., variable in colour, bluish or violet-blue or quite black.—*Handb. N.Z. Fl.* 116; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 241; *Kirk, Students' Fl.* 238. *C. myrtillifolia*, *Hook. f. Fl. Antarct.* i. 21; *Fl. Nov. Zel.* i. 108.

Var. ***pilosa***.—Much more slender and more sparingly branched. Leaves broader, thin and membranous; margins and both surfaces ciliate with soft tawny hairs.

Var. ***dumosa***.—Branches stiff and rigid, often interlacing, villous. Leaves smaller, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, narrow linear-oblong, very thick and coriaceous.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Abundant throughout, ascending to over 4000 ft. October–January.

An extremely variable plant, found in many diverse stations; abundant in rich alluvial soils in lowland forests, and quite as plentiful in high mountain valleys or on steep mountain slopes. Its distinguishing characters are the leafy habit, uniformly pubescent branches, obovate or linear-obovate coriaceous leaves, and small globose drupes. The varieties described above look distinct in their extreme forms, but are connected with the type by numerous intermediates. Var. *pilosa* approaches very close to *C. ciliata*, the flowers of which, however, are quite unknown.

20. ***C. ramulosa***, *Petrie in Trans. N.Z. Inst.* xxvii. (1895) 405.—A slender much-branched prostrate or decumbent shrub 2–4 ft. high; branches wide-spreading, the younger ones faintly pubescent; bark pale-brown or grey. Leaves opposite or fascicled on opposite twigs, $\frac{1}{3}$ in. long, about $\frac{1}{8}$ in. broad, linear-obovate, rounded at the apex, narrowed into a short petiole or almost sessile, coriaceous or almost membranous, margins flat, veins indistinct. Stipules deltoid, acute, pale-grey or almost white. Male flowers solitary, terminating short lateral branchlets, involu-cellate. Calyx wanting. Corolla $\frac{1}{8}$ in., campanulate, 4–5-partite. Female flowers not seen. Drupe globose, $\frac{1}{8}$ in. diam., dark-red.—*Kirk, Students' Fl.* 236. *C. pubens*, *Petrie, l.c.* xxvi. (1894) 267 (not of *A. Gray*).

NORTH ISLAND: Mount Hikurangi, *Petrie*! Mount Egmont, *T. F. C.*
SOUTH ISLAND: Arthur's Pass and Kelly's Hill, *Petrie*! *Kirk*! *Cockayne*!
T. F. C.; Broken River, *Cockayne*! 2500–5000 ft.

I have not seen good flowering specimens of this. In foliage it approaches certain states of *C. parviflora*, and the fruit resembles that of *C. rhamnoides*; but it differs from both in the slender rambling or prostrate habit.

21. **C. Buchanani**, *T. Kirk in Trans. N.Z. Inst.* xxiv. (1892) 424.—A much and closely branched shrub 5–10 ft. high; branches numerous, ascending, younger ones finely pubescent; bark reddish-brown. Leaves distant, $\frac{1}{2}$ –1 in. long, broadly oblong or obovate, obtuse or minutely apiculate, narrowed into a short pubescent petiole, rather coriaceous, puberulous and minutely ciliate when young, margins thickened. Stipules deltoid, acute, minutely ciliate. Male flowers unknown. Females axillary, solitary or in 2–3-flowered fascicles, involuclate. Calyx-limb minutely 4–5-toothed. Corolla narrow-campanulate, 4–5-lobed to the middle; segments acute, recurved. Styles stout. Fruit unknown.—*Students' Fl.* 239.

NORTH ISLAND: Wellington—Near Cape Terawhiti, *Buchanan*, *Kirk* ! October.

Apparently a very distinct species, the true affinities of which cannot be determined until the male flowers and fruit have been observed.

22. **C. crassifolia**, *Col. Excurs. North Is.* 75.—A much-branched rigid shrub 4–12 ft. high; branches divaricating, excessively stiff and rigid, often interlaced; branchlets glabrous or minutely puberulous; bark reddish-brown or greyish-brown, uneven and fissured on the branches, smoother on the twigs. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in. long, rarely more, broadly oblong or obovate to orbicular, rounded at the tip or retuse, abruptly narrowed into a very short petiole, usually thick and coriaceous, often glaucous beneath; margins thickened; veins obscure. Flowers involuclate, solitary or more rarely in 2–3-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{2}$ in. long, campanulate, 4-partite almost to the base. Stamens 4. Female flowers: Calyx-limb minute, truncate or obsoletely toothed. Corolla tubular, $\frac{1}{8}$ – $\frac{1}{7}$ in. long, deeply 4-lobed. Drupe $\frac{1}{4}$ in. long, subglobose or broadly oblong, yellow, sometimes white and translucent.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 242; *Kirk, Students' Fl.* 238. *C. pendula*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 84.

NORTH AND SOUTH ISLANDS: From Hokianga southwards to Otago, but often local. Sea-level to 1200 ft. September–November.

Best distinguished by the excessively stiff and rigid habit, almost glabrous branchlets, rounded coriaceous leaves, and subglobose yellow fruit. Mr. Colenso's *C. pendula* has much thinner leaves, but is not otherwise different.

23. **C. rigida**, *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 243.—An erect shrub 5–15 ft. high; branches divaricating, stout or slender, open or much interlaced, glabrous or the very young twigs puberulous; bark reddish- or purplish-brown. Leaves in opposite pairs on short lateral branchlets, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, obovate or oblong-spathulate, rounded or retuse, gradually narrowed into a short petiole, coriaceous or almost membranous, quite glabrous; veins

obscure. Stipules deltoid, glabrous. Flowers involucllate, solitary or in 2-4-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{5}$ in. long, campanulate, 4-5-partite. Females: Calyx - limb minutely 4-5-toothed. Corolla tubular, $\frac{1}{6}$ - $\frac{1}{7}$ in., deeply 3-5-lobed. Drupe $\frac{1}{4}$ - $\frac{1}{3}$ in. long, oblong or obovoid, yellow.—*Kirk, Students' Fl.* 239. *C. divaricata*, *Hook f. Fl. Nov. Zel.* i. 107 in part (not of *A. Cunn.*). *C. aurantiaca*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 464. *C. lentissima*, *Col. l.c.* 465. *C. turbinata*, *Col. l.c.* xxiv. (1892) 389.

NORTH AND SOUTH ISLANDS: Not uncommon in swampy lowland forests. September-October.

Very close to *C. crassifolia*, but not so rigid, the leaves narrower and less coriaceous, and the drupe narrower. In Mr. Colenso's herbarium there are numerous specimens of his three species quoted above. There can be no doubt whatever that they represent common states of *C. rigida*, and cannot be separated even as varieties.

24. *C. obconica*, *Kirk, Students' Fl.* 237.—An erect shrub 4-5 ft. high or more; bark pale; branches numerous, spreading, interlaced, younger ones pubescent or puberulous. Leaves $\frac{1}{8}$ - $\frac{1}{4}$ in. long, $\frac{1}{16}$ - $\frac{1}{12}$ in. broad, oblong or linear-oblong, obtuse or minutely apiculate, sessile or very shortly petiolate, coriaceous, glabrous; margins thickened, recurved; veins obscure. Flowers solitary or geminate, terminating short arrested branchlets, involucllate, decurved. Male flowers: Calyx shortly funnel-shaped, teeth deltoid. Corolla broadly funnel-shaped, 4-lobed to the middle; lobes ovate, recurved. Females: Corolla tubular, slightly ventricose at the base, teeth short, straight. Styles very long. Drupes $\frac{1}{8}$ - $\frac{1}{6}$ in. diam., broadly obconic or obcordate, yellowish-white, almost translucent.

SOUTH ISLAND: Nelson—Wairoa Gorge, *Bryant and Kirk.* August.

I am not acquainted with this, and there are no specimens in Mr. Kirk's herbarium. I have consequently reproduced his description in an abbreviated form.

25. *C. rubra*, *Petrie in Trans. N.Z. Inst.* xvii. (1885) 269.—An open or closely branched shrub 5-12 ft. high; branches slender, divaricating, glabrous or the very young ones puberulous; bark reddish-brown. Leaves $\frac{1}{4}$ - $\frac{3}{4}$ in. long or more, broadly oblong or obovate to orbicular, rounded or subacute or apiculate, abruptly narrowed into long or short ciliolate petioles, rather membranous; veins obscurely reticulated. Flowers involucllate, solitary or in 2-4-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{8}$ in. long, campanulate, 4-partite. Stamens 4. Females: Calyx-limb minutely 4-toothed. Corolla $\frac{1}{8}$ in. long, tubular, 4-lobed. Drupe $\frac{1}{4}$ in. long, oblong, yellowish-white, translucent.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 243; *Kirk, Students' Fl.* 239. *C. divaricata* var. *latifolia*, *Hook f. Fl. Nov. Zel.* i. 107.

NORTH ISLAND: Hawke's Bay, *Colenso*! SOUTH ISLAND: Nelson—Wairoa Gorge, *Bryant* and *Kirk*. Otago—Near Dunedin; Catlin's River, *Petrie*! September–November.

Nearest to *C. crassifolia*, from which it is separated by the less rigid habit, membranous leaves, and rather smaller flowers.

26. *C. virescens*, *Petrie* in *Trans. N.Z. Inst.* xi. (1879) 426.—A glabrous much-branched shrub 5–10 ft. high; branches very slender, flexuose, spreading and interlaced; bark pale greyish-brown. Leaves $\frac{1}{5}$ – $\frac{1}{3}$ in. long, spathulate or oblong-spathulate, obtuse or subacute, narrowed into a short slender petiole, membranous, quite glabrous; margins flat or slightly undulate. Stipules acute, ciliolate. Flowers involuclate, solitary or in 2–3-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{8}$ in. long, campanulate, 4-partite almost to the base. Females: Calyx-limb obsoletely 4-toothed. Corolla shorter and narrower than in the males, tubular, deeply 4-lobed. Drupe $\frac{1}{4}$ in. long, oblong, yellowish-white, translucent.—*Cheesem.* in *Trans. N.Z. Inst.* xix. (1887) 244; *Kirk, Students' Fl.* 240. *C. divaricata* var. *pallida*, *Hook. f. Fl. Nov. Zel.* 107.

NORTH ISLAND: Wairarapa and Hawke's Bay, *Colenso*! SOUTH ISLAND: Pelorus Sound, *Rutland*! Wairoa Gorge, *Bryant* and *Kirk*; Lake Forsyth, *Kirk*! various localities in Otago, *Petrie*! Sea-level to 1500 ft. September–October.

A very distinct species, perhaps more closely allied to *C. rubra* than to any other.

27. *C. acerosa*, *A. Cunn. Precur.* n. 477.—A low often excessively branched prostrate or suberect wide-spreading shrub 1–5 ft. high; branches straight or flexuous or zigzag, often closely interlaced, younger ones puberulous; bark yellowish-brown or dark-brown, often fissured and uneven. Leaves in close or distant opposite pairs or fascicles, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, about $\frac{1}{10}$ in. wide, erectopate, very uniform in shape, narrow-linear, obtuse or subacute, veinless. Flowers axillary, terminating minute arrested branchlets, involuclate. Males: Solitary or in 2–4-flowered fascicles. Calyx wanting. Corolla $\frac{1}{8}$ in. long, campanulate, 4-partite to below the middle. Stamens 4. Females solitary. Calyx-limb minutely 4-toothed. Corolla $\frac{1}{10}$ in. long, tubular, 4-lobed. Drupe globose, variable in size, $\frac{1}{6}$ – $\frac{1}{3}$ in., pale-blue, translucent.—*Baoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 109; *Handb. N.Z. Fl.* 118; *Cheesem.* in *Trans. N.Z. Inst.* xix. (1887) 244; *Kirk, Students' Fl.* 240.

Var. *a*, *arenaria*, *Kirk, l.c.* 241.—Yellow-green; branches slender, wide-spreading, flexuous and interlaced. Leaves close-set, very narrow-linear.

Var. *b*, *brunnea*, *Kirk, l.c.*—Dark-brown, branches fewer, short, stout, rigid. Leaves usually distant, shorter and more coriaceous.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Common throughout, var. *a* chiefly on sand-dunes, var. *b* in hilly or mountain districts, ascending to 4000 ft. *Tatarahake*. September–November.

Easily recognised by the peculiar habit, extremely narrow leaves, and sky-blue drupe.

28. **C. propinqua**, *A. Cunn. Precur.* n. 472.—A large branching shrub or small tree 6–20 ft. high; branches widely divaricating, young ones puberulous; bark brown or brownish-grey. Leaves opposite, or in opposite fascicles on short arrested branchlets, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, $\frac{1}{12}$ – $\frac{1}{8}$ in. wide, linear or narrow linear-oblong or narrow linear-obovate, obtuse or subacute, gradually narrowed into a very short petiole or sessile, rather coriaceous; veins obscure. Flowers solitary or in 2–4-flowered fascicles, each fascicle invested by a 4-toothed cupuliform involucre, and each flower involucellate. Males: Calyx wanting. Corolla $\frac{1}{8}$ in. long, campanulate, 4–5-partite. Females: Calyx-limb 4-toothed. Corolla $\frac{1}{8}$ in. long, tubular, 3–4-lobed. Drupe $\frac{1}{3}$ in. long, globose or broadly oblong, bluish or bluish-black or quite black.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 109; *Handb. N.Z. Fl.* 116; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 245; *Kirk, Students' Fl.* 241. *C. alba*, *Col. in Trans. N.Z. Inst.* xxiv. (1892) 388.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout in swampy forests or by the side of rivers, &c. Sea-level to 1500 ft. *Mingimingi.* September–October.

Allied to *C. Cunninghamii*, but distinguished by the more spreading habit, dark bark, smaller narrower leaves, smaller and fewer flowers, and by the drupe not being white and translucent.

29. **C. Kirkii**, *Cheesem. in Trans. N.Z. Inst.* xxix. (1897) 391.—A much and closely branched procumbent or suberect shrub, often forming rounded masses 2–4 ft. high and the same in diam.; rarely taller, erect, and loosely spreading. Branches stout, often interlaced; branchlets obscurely tetragonous, usually more or less clothed with short greyish pubescence, rarely almost glabrous. Leaves opposite or in opposite fascicles, $\frac{1}{2}$ –1 in. long, linear or narrow linear-oblong or narrow linear-obovate, obtuse or subacute, gradually narrowed into a very short petiole, flat, coriaceous or almost membranous; midrib evident below; lateral veins usually indistinct. Stipules very short, broad, ciliate. Flowers in 3–6-flowered fascicles on short arrested branchlets, rarely solitary. Males: Calyx wanting. Corolla $\frac{1}{8}$ in. long, broadly campanulate, 4–5-partite. Females smaller and narrower. Calyx-limb minutely 4-toothed. Corolla funnel-shaped, deeply 4-lobed. Drupe (immature) $\frac{1}{8}$ in. long, oblong.—*Kirk, Students' Fl.* 241. *Plagianthus linariifolia*, *Buch. in Trans. N.Z. Inst.* xvi. (1884) 394, t. 34, f. 1.

NORTH ISLAND: Auckland—Tapotopoto Bay, *Kirk!* coast between Spirits Bay and the North Cape, *T. F. C.*; near Ahipara, *R. H. Matthews!* *T. F. C.*; South Head of Hokianga Harbour, *Kirk!* Taranaki—Near Opunake, *Kirk!* Hawke's Bay—Portland Island, *Bishop Williams!*

It is possible that more species than one may be included in the above description, but the material at my disposal is insufficient to determine this. Mr. Kirk's original specimens from Tapotopoto Bay are from a procumbent shrub with closely placed fascicled leaves and pubescent branchlets, and my own, from near the North Cape, agree in habit and the pubescent branches, but have larger spreading leaves. The Ahipara plant is erect, with lax almost

glabrous branchlets, and still larger more distantly placed leaves; and Mr. Kirk's *Opunake* specimens are very similar. Bishop Williams's specimens, from Portland Island, are remarkable for the very pale bark and densely tomentose branchlets, the leaves being broader than the *Ahipara* specimens. The ripe fruit is unknown in all the forms, and the *Ahipara* plant is the only one of which good flowering specimens have been obtained.

30. *C. linariifolia*, *Hook. f. Handb. N.Z. Fl.* 118.—A much-branched shrub or small tree 6–20 ft. high; trunk sometimes 9 in. diam.; branches slender, spreading, younger ones puberulous; bark dark-grey. Leaves all opposite, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad, linear or linear-lanceolate, rarely oblong-lanceolate, acute, suddenly narrowed into a short slender petiole, flat, coriaceous, blackish when dry; veins indistinct. Stipules glabrous or puberulous, upper ones connate into a long sheath; margins usually ciliate. Flowers terminating leafy branchlets, involuclate. Males in 2–5-flowered fascicles, fascicles involuclate. Calyx wanting. Corolla $\frac{1}{6}$ – $\frac{1}{4}$ in. long, broadly campanulate, 4–5-lobed to the middle; lobes revolute. Females solitary. Calyx-limb with 4–5 large and erect linear-oblong lobes. Corolla $\frac{1}{8}$ in. long, tubular, 4–5-lobed. Drupe $\frac{1}{8}$ in. long, broadly oblong, crowned by the persistent calyx-lobes, at first pale and translucent, ultimately black.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 246; *Kirk, Forest Fl.* t. 95; *Students' Fl.* 242. *C. propinqua* var. γ , *Hook. f. Fl. Nov. Zel.* i. 109.

NORTH AND SOUTH ISLANDS: Not uncommon from the Thames River southwards. Sea-level to 3000 ft. October–November.

Easily recognised by the long sheathing stipules. In several respects it approaches *C. propinqua* and *C. Cunninghamii*, but is easily distinguished by the different habit, thinner acute leaves, and by the long calyx-lobes of the female flowers.

31. *C. Solandri*, *T. Kirk in Trans. N.Z. Inst.* xxix. (1897) 522.—A much-branched shrub; branches stout, rigid, obscurely tetragonus; branchlets numerous, short, erect; bark whitish, setose. Leaves erect, loosely imbricating, $\frac{1}{3}$ in. long, $\frac{1}{10}$ in. broad, linear-lanceolate, acute or apiculate, very coriaceous; midrib sunken on both surfaces. Stipules setose, ciliate, loosely sheathing. Flowers not seen. Drupes solitary, terminal, seated in an involucl composed of two depauperated leaves and their stipules, $\frac{1}{4}$ in. long, broadly ovoid, crowned by the persistent calyx-lobes.—*Students' Fl.* 242.

NORTH ISLAND: East Cape district, *Banks* and *Solander*.

This was described by Mr. Kirk from some specimens in the set of Banks and Solander's plants presented to the colony by the Trustees of the British Museum. The specimens, with many others, are now missing from the set, having probably been mislaid at the time of Mr. Kirk's decease. The species is apparently closely allied to *C. linariifolia*.

32. *C. foetidissima*, *Forst. Char. Gen.* 138.—Usually a slender sparingly branched shrub 6–15 ft. high, but occasionally forming a small tree 20 ft. high, with a trunk 1 ft. in diam. or more; disgust-

ingly foetid when bruised or while being dried. Branches slender, glabrous, or the very young ones minutely puberulous. Leaves variable in size and shape, $1\frac{1}{2}$ –2 in. long, $\frac{1}{4}$ – $\frac{3}{4}$ in. broad, usually oblong, but varying from linear-oblong or -obovate to rounded oblong or broad-ovate, obtuse or acute or retuse, abruptly narrowed into a rather long and slender petiole, slightly coriaceous or almost membranous; margins flat; midrib distinct; lateral veins obscure. Stipules short, cuspidate. Flowers sessile, terminating the branchlets. Males solitary or 2–3 together. Calyx often wanting, when present minute, obscurely 4-toothed. Corolla $\frac{1}{3}$ – $\frac{2}{3}$ in. long, campanulate, 4–5-lobed to the middle, rarely 8–10-lobed. Stamens the same number as the lobes. Females solitary, erect, $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Calyx-limb truncate or obscurely toothed. Corolla tubular, 3–4-lobed. Drupe $\frac{1}{3}$ in. long, oblong or ovoid, red or yellowish-red, sometimes pale and translucent.—*A. Rich. Fl. Nouv. Zel.* 261; *A. Cunn. Precur.* n. 471; *Raoul, Choix*, 46; *Hook. f. Fl. Antarct.* i. 20, t. 13; *Fl. Nov. Zel.* i. 105; *Handb. N.Z. Fl.* 116; *Kirk, Students' Fl.* 242. *C. affinis*, *Hook. f. Fl. Antarct.* i. 21, t. 14. *C. repens*, *A. Rich. Fl. Nouv. Zel.* 264 (not *Hook. f.*). *C. pusilla*, *Forst. Prodr.* n. 513. *C. sagittata*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 270.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Abundant from the Thames goldfields and Raglan southwards. Sea-level to 4500 ft. *Karamu*; *Hupiro*. August–October.

Easily distinguished by the oblong leaves, large terminal flowers, and horribly disagreeable odour when bruised.

33. **C. Colensoi**, *Hook. f. Handb. N.Z. Fl.* 117.—A small and slender erect or rarely procumbent open or closely branched shrub 2–8 ft. high; bark pale-brown or whitish; young branches puberulous. Leaves opposite or fascicled on short lateral twigs, yellowish-green, very variable in size and shape, $\frac{1}{3}$ – $1\frac{1}{2}$ in. long, linear-oblong or linear-obovate to broadly oblong or obovate, rarely narrower and linear or linear-lanceolate, obtuse or retuse, narrowed into rather slender petioles, coriaceous or almost membranous; margins flat, or recurved in the coriaceous forms; veins indistinct. Flowers terminating the branchlets, solitary on short decurved peduncles, involu-cellate. Males: Calyx wanting. Corolla $\frac{1}{2}$ in. long, campanulate, 4-lobed. Females: Calyx-limb minutely 4-toothed. Corolla $\frac{1}{2}$ in. long, tubular, 4-lobed; lobes revolute. Drupe $\frac{1}{6}$ – $\frac{1}{4}$ in. long, oblong, dark-red.—*Cheesem. in Trans. N.Z. Inst.* xix. (1887) 248; *Kirk, Students' Fl.* 243. *C. myrtilifolia* var. *linearis*, *Hook. f. Fl. Nov. Zel.* i. 108. *C. Banksii*, *Petrie in Trans. N.Z. Inst.* xxx. (1898) 433.

NORTH ISLAND: Mountainous districts from the Thames goldfields and Te Aroha southwards; not common. SOUTH ISLAND: Western portion of Nelson Province and Westland to the West Coast sounds. STEWART ISLAND: Abundant. Usually from 1500 ft. to 3500 ft., but descends to sea-level on Stewart Island. November–January.

A well-marked species, easily recognised by the terminal solitary flowers on decurved peduncles.

34. **C. retusa**, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 268.—A much-branched procumbent shrub; branches short, stout or slender, straggling; bark pale, marked by two opposite lines of pubescence interrupted at the nodes. Leaves $\frac{1}{4}$ – $\frac{2}{3}$ in. long, linear-obovate or oblong-obovate, retuse or almost 2-lobed at the tip, gradually narrowed into a short stout petiole, thick and coriaceous, flat or concave above, midrib usually distinct beneath; margins thickened and recurved, very minutely crenulate. Stipules broad, with 3 cartilaginous teeth, ciliate. Flowers solitary, terminating short leafy branchlets. Males: Calyx wanting. Corolla $\frac{1}{4}$ – $\frac{1}{3}$ in. long, broadly campanulate, 4–5-partite. Females: Calyx-limb with 4–5 subulate teeth. Corolla narrow-campanulate, 4–5-partite; segments narrow, revolute. Styles stout, sometimes 3. Drupe $\frac{1}{4}$ in. long, ovoid, yellowish-red.—*Kirk, Students' Fl.* 243.

SOUTH ISLAND: Nelson—Mount Rochfort, *Townson*! Westland—Kelly's Hill, *Petrie*! Arthur's Pass, *Cockayne*! *T. F. C.* Southland—Clinton Saddle, Lake Te Anau, *Petrie*! Longwood Range, *Kirk*! 2000–3500 ft. December–January.

A very distinct species, easily known by the straggling habit, retuse leaves with minutely crenulate margins, and rather large terminal flowers. It has the disagreeable odour of *C. fetidissima* when bruised.

35. **C. cuneata**, *Hook. f. Fl. Antarct.* i. 21, t. 15.—A stout erect or spreading closely branched shrub 2–10 ft. high; branches woody and rigid, densely leafy, the younger ones puberulous; bark greyish-white to dark-brown. Leaves close-set, usually fascicled on short lateral branchlets, $\frac{1}{5}$ – $\frac{3}{4}$ in. long, $\frac{1}{10}$ – $\frac{1}{4}$ in. broad, linear- or oblong-obovate or cuneate-oblong, obtuse or subacute, almost sessile, patent or recurved, rigid and coriaceous, often concave above, almost veinless; margins slightly recurved. Stipules short and broad, usually densely fimbriate or ciliate. Flowers solitary, terminating the branchlets, sessile, involuclate. Males: Calyx wanting. Corolla $\frac{1}{4}$ in. long, campanulate, 4–5-lobed. Females: Calyx-limb 4–5-lobed; lobes unequal. Corolla $\frac{1}{2}$ in. long, 4-lobed to the middle. Drupe $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., globose, red.—*Fl. Nov. Zel.* i. 110; *Handb. N.Z. Fl.* 117; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 249; *Kirk, Students' Fl.* 244.

NORTH ISLAND: Mount Hikurangi, *Colenso*, *Adams* and *Petrie*! Ruahine Mountains and Lake Taupo, *Colenso*; Mount Egmont, *Dieffenbach*, *T. F. C.* SOUTH ISLAND, STEWART ISLAND, AUCKLAND and CAMPBELL ISLANDS, ANTIPODES ISLANDS: Abundant in mountain districts. Usually from 2000 ft. to 5000 ft., but descends to sea-level in the Auckland Islands. November–January.

A variable plant, but separated from any other by the densely leafy habit, coriaceous often recurved linear-obovate or cuneate leaves, broad fimbriate stipules, and rather large solitary terminal flowers. In alpine localities it is often dwarfed to a foot or two in height, with rigid and woody interlaced branches and small excessively coriaceous leaves.

36. **C. microcarpa**, *Hook. f. Fl. Nov. Zel.* i. 110.—A leafy shrub 1–10 ft. high; branches slender, close-set, divaricating, pubescent, leafy; bark grey. Leaves in pairs on short lateral branchlets, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, $\frac{1}{15}$ – $\frac{1}{12}$ in. broad, spreading, linear or linear-lanceolate, acute, flat, veinless, dark-brown when dry, not coriaceous; stipules short, ciliate. Flowers minute. Males: Calyx cup-shaped, 4-toothed. Corolla broadly bell-shaped, $\frac{1}{5}$ in. diam., 4-partite; lobes narrow, acuminate, long. Females: Calyx-limb short, tubular, 4-toothed. Corolla $\frac{1}{12}$ in., tubular or funnel-shaped, 4-cleft $\frac{1}{4}$ way down. Drupe very small, globose, $\frac{1}{10}$ in. diam.—*Handb. N.Z. Fl.* 118; *Kirk, Students' Fl.* 244. ? *C. margarita*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 594.

NORTH ISLAND: Ruahine Mountains, *Colenso*! *Olsen*! SOUTH ISLAND: Nelson—Upper Maitai Valley, Graham River, *T. F. C.* Westland—Ahaura Plain, *Kirk*! Canterbury—Oxford Forest, *Kirk*!

The above description is that given in the "Handbook," but without access to the type specimens, which are in the Kew Herbarium, it is impossible to say whether the plants from the localities cited are really identical with Hooker's species or not.

37. **C. depressa**, *Col. ex Hook. f. Fl. Nov. Zel.* i. 110.—A small closely branched usually prostrate bush 1–4 ft. high; branches leafy, trailing or prostrate, younger ones puberulous; bark greyish. Leaves usually in opposite fascicles, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, $\frac{1}{15}$ – $\frac{1}{10}$ in. wide, linear-lanceolate or narrow linear-oblong, rarely linear-obovate, acute or obtuse, narrowed into a rather short petiole or almost sessile, suberect or patent or recurved, rigid and coriaceous, somewhat concave, glabrous or the margins minutely ciliate; veins indistinct. Stipules short, broad, ciliate. Flowers terminating the branchlets, solitary, sessile, involucrellate. Males: Calyx wanting. Corolla $\frac{1}{10}$ – $\frac{1}{8}$ in. long, campanulate, 4-partite. Females: Calyx-limb 4-toothed. Corolla tubular, $\frac{1}{10}$ in. long, 4-lobed. Drupe $\frac{1}{8}$ in. diam., globose, orange-yellow.—*Handb. N.Z. Fl.* 118; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 250; *Kirk, Students' Fl.* 245.

NORTH ISLAND: Lake Taupo and Ruahine Mountains, *Colenso*! Ruapehu, *Kirk*; Rangipo Plain, *Petrie*! Mount Egmont, *T. F. C.* SOUTH ISLAND: Mount Arthur Plateau, *T. F. C.*; mountains above the Otira Valley, *Petrie*! Arthur's Pass, *Cockayne*, *T. F. C.*; Kurow Mountains, *Petrie*! 2500–5000 ft. December–January.

Very close to *C. cuneata*, but a much smaller and more slender plant, with smaller and narrower leaves. It also approaches some states of *C. acerosa* var. *brunnea*, but that is a stouter and more rigid plant, with dark bark and narrower leaves.

38. **C. repens**, *Hook. f. Fl. Antarct.* i. 22, t. 16A.—A small glabrous creeping species, often forming broad matted patches. Branches 2–18 in. long or more, prostrate and rooting, stout or slender, sometimes almost flaccid; bark greyish. Leaves usually close-set, rarely distant, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, linear-oblong or linear-obovate to broadly oblong or broadly obovate, obtuse or subacute, narrowed

into very short broad petioles or almost sessile, bright-green, coriaceous, spreading or suberect; margins thickened. Stipules short and broad, obtuse, glabrous or ciliate. Flowers greenish-white, solitary, terminal. Males: Large for the size of the plant, $\frac{1}{3}$ – $\frac{3}{4}$ in. long. Calyx minute, cupular, 4- or 8-toothed. Corolla tubular, often curved, 4–8-toothed or -lobed. Stamens 4–8. Females smaller, $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Calyx-limb 4–8-toothed. Corolla tubular, 4–8-lobed to about $\frac{1}{3}$ way down. Styles 2 or 4, rarely 3 or 5. Drupe globose, $\frac{1}{4}$ in. diam., red or orange-yellow.—*Fl. Nov. Zel.* i. 110; *Handb. N.Z. Fl.* 119; *Cheesem. in Trans. N.Z. Inst.* xix. (1887) 250; *Kirk, Students' Fl.* 245. *C. pumila*, *Hook. f. Fl. Antarct.* ii. 543; *Fl. Nov. Zel.* i. 110; *Handb. N.Z. Fl.* 119. *C. perpusilla*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 466.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, MACQUARIE ISLAND: Abundant in mountain districts from the East Cape southwards; ascending to 6000 ft. on Mount Egmont and in the Southern Alps, descending to sea-level in the Auckland Islands, &c. December–January.

Easily distinguished from all other species, except *C. Petriei*, by the small size and creeping and matted habit. From *C. Petriei* it is separated by the larger and broader always glabrous leaves, much longer tubular male flowers, and smaller drupe.

39. **C. Petriei**, *Cheesem. in Trans. N.Z. Inst.* xviii. (1886) 316. —Stein prostrate and creeping, usually forming broad matted patches; branches 6–18 in. long, glabrous or puberulous. Leaves usually close-set, erecto-patent, $\frac{1}{10}$ – $\frac{1}{4}$ in. long, linear-oblong or linear-obovate, acute or obtuse, narrowed into short petioles or sessile, often concave, rigid and coriaceous, veinless, glabrous or sprinkled over with short white hairs on both surfaces. Flowers solitary, terminating short erect branchlets, involucellate. Males: Calyx wanting. Corolla $\frac{1}{5}$ – $\frac{1}{3}$ in. long, tubular at the base, campanulate above, 4-lobed. Females smaller, about $\frac{1}{5}$ in. long. Calyx-limb irregularly toothed. Corolla broadly tubular, deeply 4-lobed. Drupe large, globose, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., variable in colour, dark-purple or bluish-purple, sometimes pale and translucent.—*Kirk, Students' Fl.* 246.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to Foveaux Strait. Descends to sea-level at the mouth of the Waitaki River, ascends to over 4000 ft. in the Southern Alps. November–January.

Easily separated from *C. repens* by the shape of the male corolla and much larger drupe.

2. NERTERA, Banks and Sol.

Small slender creeping perennial herbs. Leaves opposite, glabrous or sparsely pilose. Stipules small, interpetiolar. Flowers solitary, axillary or terminal, sessile or very shortly pedicelled, hermaphrodite. Calyx-limb truncate or very obscurely 4-toothed. Corolla tubular or funnel-shaped, 4–5-lobed; lobes valvate. Stamens

4 or 5, inserted at the base of the corolla-tube; filaments long, filiform; anthers large, far-exserted, usually pendulous. Ovary 2-celled; styles 2, filiform, free nearly to the base, hirsute; ovules solitary in each cell. Drupe globose or ovoid, fleshy, containing 2 1-seeded pyrenes.

A small genus of 7 or 8 species, found in Australia and New Zealand, Java, the Philippine Islands, Andine and Antarctic South America, and Tristan d'Acunha.

Perfectly glabrous.	Leaves broad-ovate	..	..	1. <i>N. depressa</i> .
Perfectly glabrous.	Leaves narrow-ovate	..	..	2. <i>N. Cunninghamii</i> .
Hairy or villous.	Leaves cordate-ovate.	Corolla short,		
$\frac{1}{8}$ in. long ..	..	..	..	3. <i>N. dichondraefolia</i> .
Hispid.	Leaves ovate or oblong.	Corolla long, $\frac{1}{8}$ - $\frac{1}{2}$ in.,		
tubular ..	..	..	..	4. <i>N. setulosa</i> .

1. **N. depressa**, *Banks and Sol. ex Gartn. Fruct.* i. 124, t. 26.—A slender glabrous perennial, very variable in size, often forming broad matted patches; stems 2–12 in. long, creeping and rooting at the nodes. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in. long, broadly ovate or almost orbicular, acute or obtuse, rounded or truncate or almost cordate at the base, quite glabrous; petioles equalling the blade or shorter. Stipules small. Flowers very small and inconspicuous, solitary, terminal, sessile. Calyx-limb truncate or nearly so. Corolla $\frac{1}{10}$ in. long, broadly funnel-shaped, 4-lobed. Drupe globose or broader than long, red.—*Forst. Prodr.* n. 501; *A. Cunn. Precur.* n. 481; *Raoul, Choix*, 46; *Hook. f. Fl. Antarct.* i. 23; *Fl. Nov. Zel.* i. 112; *Handb. N.Z. Fl.* 120; *Benth. Fl. Austral.* iii. 431; *Kirk, Students' Fl.* 246. *N. montana*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 595.

NORTH ISLAND: Ruahine Range, *Colenso*. SOUTH ISLAND, STEWART ISLAND, AUCKLAND ISLANDS: Abundant throughout, chiefly in mountain districts. Ascents to 4000 ft. October–January.

Also found in Australia and Tasmania, South America, and Tristan d'Acunha. The leaves very rarely have a few sparse hairs on the upper surface.

2. **N. Cunninghamii**, *Hook. f. Fl. Nov. Zel.* i. 112.—Perfectly glabrous. Stems much more slender than in *N. depressa*, almost filiform, 4–18 in. long. Leaves $\frac{1}{4}$ – $\frac{1}{3}$ in. long, narrow-ovate, acute, rounded at the base; petioles about as long as the blade. Stipules small, acute. Flowers very minute, terminal. Calyx-limb truncate or obsoletely 4-toothed. Corolla shorter and broader than in *N. depressa*, $\frac{1}{12}$ in. long, 4-lobed. Stamens usually erect. Drupe globose, red, $\frac{1}{8}$ in. diam.—*Handb. N.Z. Fl.* 120; *Kirk, Students' Fl.* 247. ? *N. papillosa*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 595.

NORTH ISLAND: Mongonui and Kaitaia southwards to Cook Strait, but often local. SOUTH ISLAND: Near Westport, *Townson*! October–January.

This differs from the preceding species only in the more slender habit, narrower leaves, and slightly smaller drupe. It is said to occur in the Philippine Islands.

3. *N. dichondræfolia*, Hook. f. *Fl. Nov. Zel.* i. 112, t. 28A.—A slender creeping herb, often forming extensive matted patches. Stems 4 in. to 2 ft. long, branched, more or less hairy or villous with soft tawny hairs, rarely nearly glabrous. Leaves with the petioles $\frac{1}{4}$ – $\frac{3}{4}$ in. long, broadly ovate or almost orbicular, acute or apiculate, cordate or rounded at the base, membranous, more or less hispid or hairy above, usually glabrous or nearly so beneath; petiole longer or shorter than the blade. Stipules acute. Flowers terminal, sessile. Calyx-limb obscurely 4-toothed. Corolla $\frac{1}{8}$ in. long, funnel-shaped, 4-lobed. Drupe globose, red, $\frac{1}{8}$ in. diam.—*Handb. N.Z. Fl.* 120; *Kirk, Students' Fl.* 247. *N. gracilis*, *Raoul in Ann. Sci. Nat.* ii. (1844) 121. *N. ciliata*, *Kirk, Students' Fl.* 247. *Geophila dichondræfolia*, *A. Cunn. Precur.* n. 482.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from Mongonui and Kaitaia southwards. Sea-level to nearly 3000 ft. October–December.

Very variable in size, amount of hairiness, &c. Small specimens are sometimes almost glabrous, while large laxly branched ones are often copiously villous. Mr. Kirk's *N. ciliata*, which he distinguished by the ciliate leaves and shorter petioles, appears to me to be a trivial form only.

4. *N. setulosa*, Hook. f. *Fl. Nov. Zel.* i. 112, t. 28B.—Very variable in size, more or less hispid with short stiff hairs. Stems creeping and rooting, 3–12 in. long, putting up numerous leafy suberect branches 1–6 in. high or more. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in., broadly ovate or orbicular to oblong or oblong-obovate, obtuse, membranous, laxly clothed with stiff white hairs; margins ciliate; petiole shorter than the blade. Flowers axillary or terminal, very slender, $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Calyx-tube densely hispid; limb unequally 4–5-toothed. Corolla very long, tubular, hispid, 4–5-toothed; teeth erect. Filaments very long, wiry, far-exserted; anthers apiculate, sagittate at the base. Styles long. Drupe usually dry, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, oblong, obscurely ribbed, hispid.—*Handb. N.Z. Fl.* 120; *Kirk, Students' Fl.* 247. *N. pusilla*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 331.

NORTH ISLAND: Auckland—North Cape district, *Adams and T. F. C.*; Kaitaia, *R. H. Matthews*! between Kaihu and Maunganui Bluff, *Petrie*! *T. F. C.*; Patetere Plateau, *T. F. C.* Hawke's Bay—Dannevirke and Norsewood, *Colenso*! Wellington—Wairarapa, *Colenso*! near Wellington, *Kirk*! SOUTH ISLAND: Otago—Plentiful, *Petrie*! *Thomson*! STEWART ISLAND: *Kirk*! November–January.

Very distinct from the three preceding species, and at once recognised by the long tubular corolla. The Australian *N. reptans*, *F. Muell.*, should probably be united with it. The flowers are strongly proterogynous and possibly dimorphic as well.

3. GALIUM, Linn.

Herbs with slender quadrangular stems. Leaves in whorls of 4 to 8, of which 2 are supposed to be true leaves and the remainder stipules, although all are precisely similar in size and shape. Flowers minute, in axillary or terminal cymes. Calyx-limb obsolete. Corolla rotate, 4-lobed, rarely 3- or 5-lobed. Stamens 4;

filaments short. Ovary 2-celled; styles 2, connate at the base; stigmas capitate; ovules solitary in each cell. Fruit didymous, small, dry, indehiscent.

A large genus of over 160 species, found in all temperate regions. Both the New Zealand species are endemic.

Leaves in whorls of 4, linear-lanceolate	..	..	1. <i>G. tenuicaule</i> .
Leaves in whorls of 4, oblong ..	..	..	2. <i>G. umbrosum</i> .

1. *G. tenuicaule*, *A. Cunn. Precur.* n. 468.—Stems slender, straggling, branched, 6 in. to 3 ft. long, glabrous or slightly scabrid on the angles. Leaves in rather distant whorls of 4, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-lanceolate or oblong-lanceolate, awned or acuminate, narrowed to the base, scabrid on the margins and midrib beneath. Flowers minute, white, $\frac{1}{12}$ in. diam., in 1–4-flowered axillary cymes; peduncles usually longer than the leaves, decurved in fruit. Fruit of 2 minute globose cocci, dark-brown, glabrous.—*Raoul, Choix*, 46; *Hook. f. Fl. Nov. Zel.* i. 113; *Handb. N.Z. Fl.* 120; *Kirk, Students' Fl.* 249. *G. triloba*, *Col. in Trans. N.Z. Inst.* xx. (1888) 192.

NORTH AND SOUTH ISLANDS: Damp places on the margins of woods and swamps; not uncommon from Ahipara southwards. Sea-level to 2500 ft. December–March.

2. *G. umbrosum*, *Sol. ex Forst. Prodr.* n. 500.—Stems 1–10 in. long, suberect or prostrate, much or sparingly branched, weak or rather stiff and wiry, glabrous or more or less ciliate on the angles. Leaves in whorls of 4, $\frac{1}{10}$ – $\frac{1}{3}$ in. long, broadly oblong or elliptical-oblong, acuminate or mucronate, marked with pellucid dots when held between the eye and the light, glabrous or the margins ciliated, petioles short. Flowers very minute, white; peduncles axillary, longer than the leaves, usually 1-flowered, more rarely 2- or 3-flowered. Fruit of 2 minute globose rugulose cocci.—*Hook. f. Fl. Nov. Zel.* i. 113; *Handb. N.Z. Fl.* 121; *Kirk, Students' Fl.* 249. *G. propinquum*, *A. Cunn. Precur.* n. 469. *G. erythrocaulon*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 332.

NORTH AND SOUTH ISLANDS: From the North Cape southwards to Foveaux Strait; plentiful. Ascends to 3000 ft. December–March.

The European *G. Aparine*, L., a much larger and coarser species than either of the above, with weak straggling or subscandent scabrous stems 2–6 ft. long, and lanceolate leaves in whorls of 6–8, has become thoroughly established in many localities in both Islands.

4. *ASPERULA*, Linn.

Herbs with slender quadrangular stems. Leaves in whorls of 4 to 8, of which 2 are leaves and the remainder stipules, as in *Galium*. Flowers minute, solitary or in axillary or terminal cymes. Calyx-limb wanting. Corolla funnel-shaped, with a distinct limb and 4 spreading lobes. Stamens 4; anthers exserted. Ovary 2-celled; styles 2, more or less connate at the base; stigmas capitate. Fruit didymous, small, dry, indehiscent.

A genus comprising about 60 species, found in the temperate and sub-tropical regions of the Old World, but not extending to America or South Africa. It only differs from *Galium* in the funnel-shaped corolla. The single New Zealand species is endemic.

1. *A. perpusilla*, Hook. f. *Fl. Nov. Zel.* i. 114. — A small slender decumbent perennial. Stems weak, filiform, branched, 1-3 in. high, glabrous. Leaves in whorls of 4, $\frac{1}{15}$ — $\frac{1}{10}$ in. long, lanceolate, acuminate, awned, straight or curved, margins usually ciliate. Flowers minute, white, axillary or terminal, solitary, often unisexual; males usually pedicelled; females sessile. Calyx-tube glabrous. Corolla $\frac{1}{12}$ in. diam., campanulate, 4- or rarely 5-partite, tube very short. Styles united below, their tips free, divergent. Fruit of 2 globose minutely granulate cocci.—*Handb. N.Z. Fl.* 121; *Kirk, Students' Fl.* 248. *A. aristifera*, Col. in *Trans. N.Z. Inst.* xxi. (1889) 88.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the Lower Waikato southwards, ascending to 3000 ft. November-January.

The corolla-tube is much shorter than is usual in *Asperula*, and the species would almost be better placed in *Galium*.

A. fragrantissima, Armst. in *Trans. N.Z. Inst.* xiv. (1882) 359, is probably a form of *Galium umbrosum*.

ORDER XXXVIII. COMPOSITÆ.

Herbs, shrubs, or small trees. Leaves alternate, rarely opposite or whorled; stipules wanting. Inflorescence composed of one or many flower-heads (*capitula*), each consisting of numerous minute flowers (*florets*) sessile and densely packed on the enlarged tip of the flower-stalk (*receptacle*), surrounded by an involucre of whorled bracts and resembling a single flower. Heads either solitary and terminal (rarely axillary) or arranged in corymbose cymes or panicles, sometimes contracted into clusters or even compound heads. Involucre of few or many bracts (scales of the involucre) arranged in one or several rows. Receptacle either naked (no bracteoles mixed with the florets) or with bracteoles in the shape of chaffy scales or bristles (*paleæ*) placed at the outside of most or all of the florets, sometimes with the surface pitted or honeycombed. Florets many or few (very rarely 1), either all of one kind as regards sex, when the heads are said to be *homogamous*, or of more than one kind, when they are called *heterogamous*. The homogamous heads either have all their florets tubular and hermaphrodite (*discoid*) or all ligulate and hermaphrodite (*liguliflorous*). The heterogamous heads frequently have the central florets tubular and hermaphrodite or male, and the outer ones ligulate and female or neuter. The heads are then said to be *radiate*. The tubular florets in the centre are called florets of the disc, or simply *disc-florets*; the ligulate ones florets of the ray, or *ray-florets*. Heterogamous

heads are also discoid when the marginal female florets have tubular corollas instead of ligulate. Calyx superior, adnate to the ovary and hardly to be distinguished from it; limb either wanting or composed of scales, bristles, or hairs, and then called *pappus*. Corolla gamopetalous, superior, either tubular or campanulate with 4-5 valvate lobes, or ligulate with the lobes cohering into a strap-shaped lamina which spreads to one side. Stamens 4-5, inserted on the tube of the corolla and alternate with its lobes; filaments usually free; anthers united into a sheath surrounding the style, cells sometimes produced at the base into bristle-like points or tails. Ovary inferior, 1-celled; style slender, 2-fid, branches short or long, linear, usually semi-terete, furnished with variously placed and arranged collecting-hairs for sweeping the pollen from the anther-cells, margins stigmatic; ovule solitary, erect, anatropous. Fruit a small dry seed-like nut called an *achene*, either crowned by the persistent pappus or naked. Seed erect, with a membranous testa; albumen wanting; embryo straight, radicle short, inferior.

A vast order, by far the largest of flowering plants, comprising about 800 genera and 10000 species. It is found in every part of the world, from the equator to the limits of phænogamic vegetation in the arctic and antarctic regions, and is equally plentiful in lowland districts and in mountainous or alpine situations. In New Zealand it constitutes rather more than one-seventh of the total number of flowering plants, a somewhat large proportion, the ratio of the whole order to the flowering plants of the world being generally estimated at about one-tenth. Although so numerous in species, the order is far from being proportionately important from an economic point of view. Edible species are singularly few, the chief being the Jerusalem and common artichoke, lettuce, and chicory. Oils are yielded by the sunflower and by *Madia sativa*. The chief medicinal plants are arnica, wormwood, and camomile. Many ornamental species are cultivated in gardens, as the various kinds of chrysanthemums, dahlias, cinerarias, asters, sunflowers, zinnias, marigolds, &c.; but on the whole it must be confessed that the majority of the plants composing the order present a weedy and unattractive appearance. Of the 26 indigenous genera 16 are widely spread; 5 extend to Australia alone (*Brachycome*, *Olearia*, *Celmisia*, *Raoulia*, *Craspedia*), but of these *Celmisia* and *Raoulia* are very feebly represented outside New Zealand. One genus (*Cassinia*) reaches South Africa as well as Australia; one (*Abrotanella*) occurs in Australia, Tasmania, and antarctic South America. The three remaining (*Pleurophyllum*, *Haastia*, *Brachyglottis*) are endemic. Many weeds of cultivation belonging to the order have become naturalised in the colony, a list of over 60 species being given in the appendix. Most of these are from the Northern Hemisphere, and descriptions of nearly all will be found in any British Flora.

Owing principally to the large size and homogeneous character of the order, very great difficulty has always been experienced in arranging the species in suitable genera and tribes, and the classification is still in an unsettled state. As there are no important differences in the flower and fruit, it becomes necessary to use minor characters, such as the shape of the style-branches; the sexual differences of the florets composing the heads; the shape of the corolla; the absence or presence of minute tails to the anthers; the various modifications of the pappus; and the minute differences in the shape and sculpture of the ripe fruit or achene. Considerable practice is required before these distinctions can be understood, and a beginner will find it no easy matter to refer the species to their proper genera. His best plan will be to induce some friend to name a few for him, and then to carefully compare these with the specific, generic, and

ordinal characters given in this book, or in other works on the flora. By so doing he will insensibly acquire a practical knowledge of the characters used in distinguishing the species and genera which will ultimately enable him to identify them for himself. In using the subjoined key to the New Zealand genera it must be remembered that the minute differences in the shape of the style-branches, so largely employed to separate the tribes from one another, can only be observed in the hermaphrodite florets, the style of the female florets being very similar throughout the order.

SUBORDER TUBULIFLORÆ.

Heads with the florets all tubular and hermaphrodite, or with the marginal ones alone ligulate and female or neuter.

TRIBE 1. EUPATORIACEÆ.

Heads homogamous, florets all tubular, hermaphrodite. Anthers obtuse at the base. Style-branches long, obtuse, thickened upwards or club-shaped, equally minutely papillose.

Herb with opposite leaves. Achene 5-angled. Pappus of
5-10 scales or bristles 1. AGERATUM.

TRIBE 2. ASTEROIDEÆ.

Heads heterogamous, radiate or discoid, or with the ray deficient and then homogamous. Anthers nearly entire at the base. Receptacle naked. Style-branches flattened, produced above the stigmatic margins into a triangular or lanceolate papillose appendage.

A. Female florets ligulate, forming a more or less conspicuous ray. (Ray absent in some species of Olearia, and dwarfed in two species of Pleurophyllum.)

* Pappus wanting, or of minute scales or setæ.

Herbs. Leaves usually radical. Pappus entirely wanting.
Achene narrowed upwards into a neck or beak .. 2. LAGENOPHORA.
Herbs. Leaves radical or cauline. Pappus wanting or of
scale-like bristles. Achene not beaked .. 3. BRACHYCOME.

** Pappus long, copious.

Shrubs or trees. Scales of the involucre in several series,
margins scarious. Achenes nearly terete .. 4. OLEARIA.
Herbs. Leaves all radical, large, many-nerved. Heads
numerous, racemed .. 5. PLEURO-
PHYLLUM.
Usually stemless herbs with radical leaves, but stems
sometimes elongated and the leaves cauline. Scapes
simple; heads solitary .. 6. CELMISIA.
Branched leafy herb. Heads solitary, terminal. Achene
much flattened. Style-branches with subulate tips .. 7. VITTADINIA.

B. Female florets tubular, in many series.

Alpine woolly herbs. Stems caespitose or compacted into
hard rounded masses. Heads broad, sessile .. 8. HAASTIA.

TRIBE 3. INULOIDEÆ.

Heads heterogamous and discoid (rarely radiate in some foreign genera), or homogamous through the suppression of the female florets. Anther-cells produced at the base into filiform tails. Style-branches linear, obtuse, never ending in an appendage.

A. Female florets tubular, filiform, in from 2 to many series, always outnumbering the hermaphrodite ones.

Herbs. Heads corymbose or clustered, rarely solitary.

Pappus-hairs capillary, not barbellate 9. GNAPHALIUM.

B. Female florets tubular, filiform, in 1 or 2 series, sometimes altogether wanting, fewer in number than the hermaphrodite ones (sometimes outnumbering the hermaphrodite ones in Raoulia).

Herbs, usually alpine. Stems creeping or cæspitose, often compacted into hard rounded masses. Heads solitary, small, sessile. Involucral bracts often white and radiating 10. RAOULIA.

Herbs or small shrubs. Heads solitary or corymbose. Pappus-hairs various, often barbellate. Receptacle naked 11. HELICHRYSUM.

Shrubs with narrow leaves. Heads corymbose. Receptacle narrow; florets few, usually subtended by chaffy scales 12. CASSINIA.

Herbs. Flower-heads numerous, aggregated into a globose compound head surrounded by scarious bracts. Female florets wanting. Receptacle with scales between the florets 13. CRASPIDIA.

TRIBE 4. HELIANTHOIDEÆ.

Heads heterogamous, usually radiate, rarely discoid, or with the ray deficient and then homogamous. Receptacle with scales among the florets. Anther-cells not tailed. Style-branches truncate or furnished with an appendix. Pappus of stiff awns or short scales, never of capillary bristles.

Involucral bracts in two series: outer narrow, glandular, spreading; inner broader, erect, and enclosing the ray-florets. Pappus wanting 14. SIEGESBECKIA.

Involucral bracts in two series, about equal. Pappus of 2-4 stiff awns 15. BIDENS.

TRIBE 5. ANTHEMIDEÆ.

Heads heterogamous, radiate or discoid; or with the ray deficient and then homogamous. Involucral bracts dry or scarious at the tips. Receptacle naked or paleaceous. Anther-cells without tails. Style-branches truncate. Pappus wanting, or a crown of short scales.

Herbs, usually flaccid or succulent. Heads discoid, pedunculate; female corolla short and broad. Achenes flattened, often winged 16. COTULA.

Diffuse or prostrate herb. Heads discoid, sessile, axillary. Achenes hardly flattened, 3-4-ribbed or -angled 17. CENTIPEDA.

Minute alpine herbs. Leaves entire, fleshy. Heads discoid. Female corolla tubular. Achene flattened or 4-angled 18. ABROTANELLA.

TRIBE 6. SENECTIONIDEÆ.

Heads heterogamous, radiate or discoid; or with the ray deficient and then homogamous. Involucral bracts usually in a single row, with a few small ones at the base. Receptacle usually naked. Anther-cells sometimes sagittate at the base, but with no true tails. Style-branches truncate or appendiculate. Pappus of capillary bristles.

Herbs. Heads discoid. Female florets very slender, filiform, in 2-3 series 19. ERECHTHITES.

- Shrubs. Female florets ligulate; lamina short, furnished at the base with 1 or 2 minute lobes. Achenes terete, papillose 20. BRACHYGLOTTIS.
 Herbs, shrubs, or trees. Female florets ligulate, never filiform 21. SENECIO.

SUBORDER LIGULIFLORÆ.

Florets all ligulate and hermaphrodite, and hence homogamous.

Sap milky. Consists of one tribe, CICHORACEÆ.

- Herb with radical leaves. Scapes simple, leafless. Pappus of tapering subulate scales, toothed or plumose above .. 22. MICROSERIS.
 Branched leafy herb. Achene ribbed and transversely rugose. Pappus soft, plumose 23. PICRIS.
 Herb with radical leaves (the New Zealand species). Achene terete, ribbed. Pappus of simple capillary bristles 24. CREPIS.
 Herbs with radical leaves. Scapes simple, leafless. Achenes long-beaked. Pappus of simple capillary bristles 25. TARAXACUM.
 Tall leafy succulent herbs. Achene flat, not beaked. Pappus of simple capillary bristles 26. SONCHUS.

1. AGERATUM, Linn.

Erect herbs or rarely shrubs. Leaves opposite or the upper alternate. Heads usually corymbose, homogamous and discoid. Involucre campanulate; bracts 2-3-seriate, linear, subequal. Receptacle flat or nearly so, naked or with deciduous scales among the florets. Florets all tubular, hermaphrodite, equal; corolla-limb regularly 5-cleft. Anthers obtuse at the base. Style-branches elongate, obtuse. Achenes 5-angled. Pappus of 5 free or connate scales, or of 10-20 narrower ones.

A small genus of about 18 species, confined to America with the exception of the following one, which is universally spread through all warm regions.

1. *A. conyzoides*, Linn. *Sp. Plant.* 839.—A stout erect branching annual herb 1-3 ft. high, more or less clothed with spreading hairs. Leaves opposite, 1-3 in. long, $\frac{1}{2}$ -2 in. broad, ovate, obtuse or subacute, petiolate, crenate or crenate-serrate. Flower-heads small, $\frac{1}{4}$ in. diam., in dense terminal corymbs. Involucre nearly glabrous; bracts striate, acute, in about 2 rows. Florets numerous, blue or white. Achenes black, glabrous or slightly hispid. Pappus of 5 awned lanceolate scales.—*D.C. Prodr.* v. 108; *Benth. Fl. Austral.* iii. 462; *Cheesem. Trans. N.Z. Inst.* xx. (1888) 169; *Kirk, Students' Fl.* 256.

KERMADEC ISLANDS: Abundant, T. F. C., Miss Shakespear! Wild *Heliotrope*.

2. LAGENOPHORA, Cass.

Small perennial herbs. Leaves often all radical. Scapes slender, unbranched. Heads solitary, small, heterogamous. Involucre short, almost hemispherical; bracts in about two rows, with

dry or scarious margins. Receptacle convex, naked. Ray-florets in 1-3 series, female, fertile, ligulate or rarely short and tubular; ligule usually white. Disc-florets numerous, hermaphrodite, tubular, with a broad 5-toothed limb. Anthers obtuse at the base. Style-branches of the disc-florets long, flattened, with lanceolate or triangular tips. Achenes compressed, abruptly contracted at the top into a more or less distinct beak; those of the disc-florets often narrower and sterile. Pappus wanting.

A small genus of about 16 species, mainly found in Australia and New Zealand, but with outlying species in eastern Asia, the Sandwich Islands, and extra-tropical South America.

- | | |
|---|----------------------------|
| Glabrate or pilose. Leaves mostly radical; petioles slender; blade orbicular or broadly oblong. Heads $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. | |
| Achenes small, nearly straight | 1. <i>L. Forsteri</i> . |
| Glabrate or pilose, slender. Leaves mostly radical; petioles slender; blade orbicular or obovate. Heads $\frac{1}{2}$ - $\frac{1}{3}$ in. diam. | |
| Achenes larger, curved or falcate | 2. <i>L. petiolata</i> . |
| Scaberulous. Leaves mostly cauline; petioles slender; blade oblong-spathulate. Heads $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. | 3. <i>L. Barkeri</i> . |
| Glabrate or pilose. Leaves mostly cauline; petioles slender; blade ovate. Achene oblanceolate | 4. <i>L. purpurea</i> . |
| Softly hirsute. Leaves all radical; petiole broad, flat; blade obovate, pinnatifid. Heads $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. | 5. <i>L. pinnatifida</i> . |
| Leaves hirsute, all radical; petioles short, broad; blade oblong-spathulate. Heads $\frac{1}{4}$ - $\frac{1}{3}$ in. diam. Achene glabrous | 6. <i>L. lanata</i> . |

L. linearis, Petrie in Trans. N.Z. Inst. xxv. (1893) 471, is *Brachycome lineata*, Kirk. *L. emphyosopus*, Hook. f., an Australian species, has become naturalised on Banks Peninsula and near Wellington. It has the habit, fleshy roots, and hirsute leaves of *L. lanata*, but can at once be distinguished by the short stout scapes and almost tubular ray-florets.

1. ***L. Forsteri***, *D.C. Prodr.* v. 307.—A small daisy-like herb, either tufted or with creeping and rooting stolons furnished with tufts of radical leaves at the nodes. Leaves all radical or cauline, $1\frac{1}{2}$ -2 in. long; petiole long, slender; blade $\frac{1}{2}$ -1 in., orbicular or orbicular-oblong to obovate, obtuse, narrowed into the petiole, coarsely crenate-dentate or almost lobed, almost glabrous or more or less hirsute. Scape 1-6 in. long, slender, naked or with 1-3 minute linear bracts. Heads $\frac{1}{4}$ - $\frac{1}{2}$ in. diam.; involucre bracts linear, acute; margins thin, scarious, entire or finely jagged. Ray-florets numerous; ligules white, revolute. Achenes small, linear-obovate, straight or very slightly curved, abruptly narrowed into a short hardly viscid beak; margins thickened.—*A. Cunn. Precur.* n. 436; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 125; *Handb. N.Z. Fl.* 137; *Kirk, Students' Fl.* 256. *Calendula pumila*, *Forst. Prodr.* n. 305. *Microcalia australis*, *A. Rich. Fl. Novv. Zel.* 231, t. 30.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 3000 ft. *Papataniwhaniwha*; *Native Daisy*. October-February.

A variable plant, very closely connected with the three following species.

2. **L. petiolata**, Hook. f. *Fl. Nov. Zel.* i. 125.—Habit of *L. Forsteri*, but smaller and much more slender. Leaves usually radical, spreading, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; petiole slender, half the length or more; blade variable in shape, obovate to orbicular, sometimes broader than long, obtuse, rather thin, acutely coarsely toothed with the teeth apiculate, more or less hairy on both surfaces, often purplish beneath. Scape very slender, strict, 2–6 in. long, usually hirsute. Heads small, $\frac{1}{5}$ – $\frac{1}{3}$ in. diam.; involucre bracts linear, acute, often purplish at the tips; margins scarious. Ray-florets numerous; ligule very narrow, revolute. Achenes rather longer and more turgid than in *L. Forsteri*, linear-obovate, curved or falcate, slightly glandular above, narrowed into a rather long beak; margins thickened. — *Handb. N.Z. Fl.* 137; *Kirk, Students' Fl.* 257. *L. strangulata*, Col. in *Trans. N.Z. Inst.* xxii. (1890) 471.

Var. **minima**, Cheesem.—Very small, $\frac{1}{2}$ –2 in. high. Leaves with the petiole $\frac{1}{2}$ –1 in. long, membranous, dentate, sometimes lobed or pinnate at the base. Scapes filiform. Heads small.—*L. Forsteri* var. *minima*, *Kirk, l.c.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the Upper Thames and Waikato southwards, ascending to 4000 ft. November–January. Var. *minima*: Moist rocks by the side of streams; Bay of Islands to Te Aroha.

Very closely allied to *L. Forsteri*, but separated by the more slender habit, smaller and thinner leaves, smaller heads with shorter and narrower rays, and longer and narrower curved achenes. Mr. Kirk places the var. *minima* under *L. Forsteri*, but to me it appears much nearer to *L. petiolata*.

3. **L. Barkeri**, *Kirk, Students' Fl.* 257.—Stems leafy, slender, erect, 3–9 in. high. Leaves cauline, usually gradually diminishing in size upwards, 1–2 in. long; petiole about half the length; blade obovate-spathulate to narrow oblong-spathulate, obtuse or sub-acute, gradually narrowed into the petiole, coarsely crenate-dentate, scaberulous on both surfaces. Scape shorter or longer than the leafy part of the stem, scaberulous and pilose. Head $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; involucre bracts linear, acute, thin, often purplish. Ray-florets numerous; ligules white, revolute. Ripe achenes not seen.

SOUTH ISLAND: Nelson—Sphagnum swamps in the Clarence Valley and near Lake Tennyson, *T. F. C.* Canterbury—By the Porter River, *Kirk*! Craigieburn Mountains, *Cockayne*! Cass River, near Lake Tekapo, *T. F. C.* 1500–3500 ft. December–January.

Far too closely allied to *L. Forsteri*, from which it only differs in the leafy stems, narrower scaberulous leaves, and (according to *Kirk*) in the linear short-beaked achenes.

4. **L. purpurea**, *Kirk, Students' Fl.* 257.—“Stems leafy below, naked above, erect, slender, grooved, 4–6 in. high, pubescent or puberulous. Leaves (including the petiole) $1\frac{1}{2}$ in. long, membranous, ovate, radical and cauline, rather distant, truncate at the base, rounded at the apex, serrate or crenate-serrate, teeth apiculate, pubescent on both surfaces, ciliate, purple beneath. Heads $\frac{1}{3}$ – $\frac{1}{2}$ in.

diam. ; involueral bracts in about 3 rows, linear, acute, with scarious margins, keeled, midrib distinct, often tipped with purple. Achenes oblanceolate, compressed, with a rather long beak and thin margins."

SOUTH ISLAND : Otago—Catlin's River, *Kirk* !

This appears to be founded on three immature specimens in Mr. Kirk's herbarium, and in the absence of additional information I have reproduced his description. It is probably nothing more than a large state of *L. petiolata*.

5. *L. pinnatifida*, *Hook. f. Fl. Nov. Zel.* i. 126.—Softly hairy or pilose in all its parts. Leaves all radical, spreading, 1–3 in. long, narrow obovate-oblong or obovate-spathulate, obtuse at the tip, narrowed into a long broad petiole, membranous, deeply crenate-lobed or almost pinnatifid ; margins ciliate. Scapes 3–10 in. long, slender. Heads $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. ; involueral bracts linear, acute, pubescent. Ray-florets numerous ; ligules narrow, revolute. Achenes compressed, obliquely linear-obovate, narrowed to the base, suddenly contracted at the tip into a short straight neck, more or less glandular-pubescent ; margins thickened.—*Handb. N.Z. Fl.* 137 ; *Kirk, Students' Fl.* 258.

NORTH ISLAND : Auckland, *Sinclair* ; sandhills near Helensville, *T. F. C.* ; East Cape, *Colenso* ! SOUTH ISLAND : Nelson—Wairau Valley, *Kirk* ! *T. F. C.* ; Marlborough, *Rough* ! Canterbury, *Sinclair* and *Haast* ; Upper Waimakariri, *T. F. C.* ; Otago, *Lindsay*, *Buchanan* ! *Petrie* ! Sea-level to over 2000 ft. December–January.

6. *L. lanata*, *A. Cunn. Precur.* n. 437.—Root-fibres stout, fleshy, almost tuberous. Leaves numerous, all radical, densely tufted, 1–1½ in. long, oblong- or obovate-spathulate, obtuse or subacute, narrowed into a rather short broad petiole, coriaceous, coarsely and irregularly crenate-dentate, both surfaces hirsute or villous with copious soft hairs. Scapes 2–7 in. long, slender, wiry, erect, glabrous or nearly so, naked or with a few minute linear bracts. Heads $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. ; involueral bracts linear, obtuse or subacute, glabrous, purple-tipped ; margins scarious. Ray-florets numerous ; ligules short, revolute. Achenes quite smooth, slightly falcate, compressed, narrowed at the base, suddenly contracted at the top into a short curved neck ; margins thickened.—*Raoul, Choix*, 45 ; *Hook. f. Fl. Nov. Zel.* i. 126 ; *Handb. N.Z. Fl.* 137 ; *Kirk, Students' Fl.* 258.

NORTH ISLAND : Dry clay hills from Mongonui southwards to the Auckland Isthmus ; not common.

Easily distinguished by the hirsute leaves and glabrous scapes and achenes.

3. BRACHYCOME, *Cass.*

Small perennial herbs ; either tufted with radical leaves and 1-headed scapes, or the stems branched, elongated, and clothed with alternate cauline leaves. Heads heterogamous, usually radiate. Involucre hemispherical or nearly so ; bracts in about 2 series, with scarious margins. Receptacle convex or conical,

naked. Ray-florets in one series, numerous, female, ligulate. Disc-florets numerous, hermaphrodite, tubular, limb more or less dilated, 5-toothed. Anthers obtuse at the base. Style-branches of the disc-florets flattened, with lanceolate or triangular tips. Achenes compressed, with winged margins, or thick and obtusely 4-angled. Pappus a ring of short scale-like bristles or altogether wanting.

The genus has its headquarters in Australia, where there are nearly 40 species. In addition to those, and the five following found in New Zealand, there is one from tropical South Africa and another from Assam.

* Stemless. Leaves all radical.

Minute, perfectly glabrous. Leaves narrow-linear, $\frac{1}{4}$ –1 in.

long. Heads $\frac{1}{10}$ in. diam. 1. *B. lineata*.

Leaves $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, narrow linear-spathulate, closely and uniformly pinnatifid 2. *B. pinnata*.

Leaves $\frac{1}{2}$ –3 in. long, oblong- or obovate-spathulate, rarely narrower, entire toothed or lobed 3. *B. Sinclairii*.

** Stems branched from the base. Leaves radical and cauline.

Stems 2–4 in. Leaves few, $\frac{1}{2}$ –1 in., oblong-spathulate, unequally 3–8-lobed. Heads $\frac{1}{4}$ – $\frac{1}{2}$ in. 4. *B. odorata*.

Stems 3–12 in. Leaves numerous, 1–3 in., oblong-spathulate, coarsely toothed or lobed. Heads $\frac{1}{2}$ in. diam. .. 5. *B. Thomsoni*.

B. simplicifolia, J. B. Armstr. in Trans. N.Z. Inst. xiii. (1881) 338, is quite unknown to me, and there are no specimens in any public collection in the colony. It probably does not belong to the genus.

1. ***B. lineata***, T. Kirk, *Students' Fl.* 259.—A minute tufted plant $\frac{1}{2}$ –1 $\frac{1}{2}$ in. high, perfectly glabrous in all its parts. Leaves numerous, all radical, $\frac{1}{4}$ –1 in. long, about $\frac{1}{25}$ in. wide, broadest towards the tip, obtuse or subacute, narrowed to the base, which is slightly broader and sheathing, flat, quite entire. Scapes 2–5, slender, strict, naked, elongating in fruit, about twice as long as the leaves. Heads solitary, small, $\frac{1}{15}$ – $\frac{1}{10}$ in. diam.; involucre bracts about 8, oblong-ovate, with broad purple scarious margins. Ray-florets few; ligules short, white, revolute. Achenes very small, pale, compressed, linear-obovate, obtuse, quite smooth and glabrous. Pappus wanting.—*Lagenophora linearis*, Petrie in Trans. N.Z. Inst. xxv. (1893) 271.

SOUTH ISLAND: Grassy flats near Lake Te Anau, Petrie! January–February.

A curious little species, quite unlike any other.

2. ***B. pinnata***, Hook. f. *Handb. N.Z. Fl.* 138.—Rhizome stout, creeping, branched, ascending at the tips. Leaves radical, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, linear or narrow linear-spathulate, deeply and closely pinnatifid; segments broadly oblong or rounded, coriaceous, entire, flat or concave beneath, glabrous or minutely glandular-pubescent. Scapes 2–6 in. long, slender, naked, glandular-pubescent. Heads $\frac{1}{3}$ in. diam.; involucre bracts oblong, pubescent; margins purple, scarious

and often jagged. Achenes obovate, glabrous; margins thickened. Pappus of very minute scales.—*Kirk, Students' Fl.* 259. *B. radicata* var. *b*, *Hook. f. Fl. Nov. Zel.* i. 127.

SOUTH ISLAND: Canterbury Plains—Near Burnham, *Kirk!* between Springfield and the Kowai River, *T. F. C.* STEWART ISLAND: *Lyll* (*Handbook*). December–January.

Although this has a very different appearance from the ordinary state of *B. Sinclairii*, some varieties of that plant approach it so closely as to be almost indistinguishable.

3. *B. Sinclairii*, *Hook. f. Handb. N.Z. Fl.* 137.—An exceedingly variable perennial herb 1–12 in. high, glabrous or more or less glandular-pubescent. Rhizome short, stout, branched, ascending at the tip. Leaves all radical, $\frac{1}{2}$ –3 in. long, oblong- or obovate-spathulate to linear-spathulate, rounded at the tip, gradually narrowed into a rather broad flat petiole, coriaceous or almost membranous, sometimes slightly fleshy, entire or variously toothed or lobed or even pinnatifid. Scapes 1 or several, strict, 1–12 in. high, glabrous or more or less glandular, naked or with 1–2 minute linear bracts. Heads very variable in size, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam.; involucrel bracts oblong to linear, obtuse or subacute, glabrous or glandular-pubescent; margins thin, purplish or whitish, usually jagged. Ray-florets numerous; ligules very variable in length. Achenes much compressed, narrow-obovate, usually glabrous, margins slightly thickened.—*Kirk, Students' Fl.* 260.

NORTH ISLAND: Mountainous districts from the East Cape southwards, but rare and local. SOUTH ISLAND: Abundant in mountain districts throughout. 1000–6000 ft. December–February.

Very variable in the size and shape of the leaves, and in their being entire, toothed, or lobulate, or even pinnatifid; but the variations are not constant, and entire and lobulate leaves can often be found on the same plant. The heads also vary greatly in size.

4. *B. odorata*, *Hook. f. Handb. N.Z. Fl.* 138.—Rhizome stout, creeping, branched, ascending at the tips. Stems 2–4 in. long, erect or ascending, branched from the base, more or less pubescent or glandular, as are the leaves, scapes, and involucres. Leaves few, $\frac{1}{2}$ –1 in. long, including the slender petiole; blade oblong- or obovate-spathulate, obtuse, deeply and unequally 3–8-lobed. Peduncles terminating the branches, 1–3 in. long, rather slender. Heads $\frac{1}{4}$ – $\frac{1}{3}$ in. diam.; involucrel bracts oblong, obtuse. Ray-florets with short ligules. Achenes linear-clavate, densely glandular-pubescent.—*Kirk, Students' Fl.* 260. *B. radicata*, *Hook. f. Fl. Nov. Zel.* i. 127 (*in part*).

NORTH ISLAND: Kaweka, Hawke's Bay, *H. Tryon!* Patea, Wellington, *Colenso!* *Roniu.*

Of this species there are three specimens in Mr. Colenso's herbarium, and I have also seen a single specimen collected by Mr. Tryon. Mr. Colenso states that the plant was prized by the Maoris on account of its fragrance, and that the flowers were often strung like daisies and worn round the neck.

5. **B. Thomsoni**, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 372, t. 27.—Rhizome stout, creeping, branched. Stems 3–12 in. long, stout, branched from the base, decumbent or ascending, densely glandular-pubescent, as are the leaves, scapes, and involucre. Leaves numerous, radical and cauline, 1–2 in. long, oblong- or obovate-spathulate, obtuse, narrowed into a very broad flat petiole, coarsely bluntly toothed or lobed or almost pinnatifid. Peduncles terminating the branches, 3–6 in. long or more, stout, somewhat rigid, naked or with a solitary linear bract. Heads about $\frac{1}{2}$ in. diam.; involucre bracts oblong or oblong-ovate, obtuse, with purple tips. Ray-florets usually numerous, but sometimes wanting in reduced states; rays white, spreading. Achenes linear-clavate, densely glandular-pubescent; margins thickened. Pappus of minute bristly scales.—*Students' Fl.* 260.

Var. **membranifolia**, *Kirk, l.c.* 261.—More slender and less branched, and not so glandular. Leaves 1–3 in. long, membranous; petioles longer and more slender.

Var. **polita**, *Cheesem.*—Usually glabrous, except the peduncles. Stems very slender, simple or sparingly branched, leafy at the base. Leaves 1–3 in., very thin and membranous. Heads rather smaller.—*B. polita*, *Kirk, Students' Fl.* 261.

SOUTH ISLAND: Otago—Cape Whanbrow, *Kirk! Petrie!* near Green Island, *Petrie.* STEWART ISLAND: Common on the coast, *G. M. Thomson! Petrie! Kirk!* Var. **membranifolia**: Mount Arthur Plateau, Nelson, *T. F. C.* Var. **polita**: Arthur's Pass, *Kirk! Cockayne!* Sea-level to 4000 ft. December–January.

A very variable plant, only separated from *B. odorata* by the much larger size and coarser habit and larger heads. It has the same strong fragrance.

4. **OLEARIA**, Mœnch.

Shrubs or trees. Leaves alternate, rarely opposite or fascicled, usually with white or buff tomentum beneath. Heads large or small, solitary or corymbose or paniculate, radiate or rarely discoid. Involucre broad or narrow; bracts imbricated in several rows, margins dry or scarious. Receptacle flat or convex, pitted. Florets few or many, rarely solitary; ray-florets female, in a single row, usually ligulate, spreading, rarely slender and filiform or altogether wanting; disc-florets hermaphrodite, tubular, 5-lobed. Anthers often acute at the base or with minute tails, rarely obtuse. Style-branches flattened, with short obtuse or rarely lanceolate appendages. Pappus of one or more rows of unequal scabrid bristles, often thickened at the tips. Achenes ribbed or striate, terete or slightly compressed.

In addition to the 35 species found in New Zealand, all of which are endemic, there are about 70 others, confined to Australia and Tasmania with the exception of 2 recorded from Lord Howe's Island. The genus is very closely allied to *Aster*, with which the late Baron von Mueller proposed to unite it, together with *Celmisia* and several other genera.

A. Heads large, 1-3 in. diam., solitary or racemed.

* Heads radiate, very large, solitary on a long naked peduncle.

Leaves 4-6 in. long, oblong or obovate, entire. Heads
 2-3 in. diam. 1. *O. insignis*.

** Heads radiate, solitary on bracteate peduncles (racemed in *O. Traillii*).

Leaves $1\frac{1}{2}$ -2 $\frac{1}{2}$ in., linear or linear-lanceolate. Peduncle
 slender. Rays purple 2. *O. semidentata*.

Leaves 1-3 in., elliptic-lanceolate to oblong-obovate.
 Peduncles slender. Rays purple or white 3. *O. chathamica*.

Leaves 2-4 in., obovate-lanceolate. Peduncles stout;
 bracts numerous, short, close-set. Rays white; disc-
 florets yellow 4. *O. operina*.

Leaves 3-5 in., narrow-lanceolate. Peduncles stout;
 bracts lax, long, foliaceous. Rays white; disc-florets
 purple 5. *O. angustifolia*.

Leaves 3-6 in., lanceolate or obovate-lanceolate. Heads
 racemed. Rays white; disc-florets purple 6. *O. Traillii*.

*** Heads discoid, racemed.

Leaves 2-6 in., obovate or obovate-oblong, acutely serrate 7. *O. Colensoi*.

Leaves 4-8 in., orbicular-ovate, doubly crenate 8. *O. Lyallii*.

B. Heads small, $\frac{1}{6}$ - $\frac{1}{2}$ in. diam., panicled or corymbose (solitary in *O. nummulariifolia*). Florets 6-24.

* Leaves opposite.

Leaves $1\frac{1}{2}$ -2 $\frac{1}{2}$ in., oblong. Panicles axillary. Heads dis-
 coid 9. *O. Traversii*.

Leaves 2-4 in., elliptic-lanceolate. Heads radiate 10. *O. Buchananii*.

** Leaves alternate, large, $1\frac{1}{2}$ -4 in. long (less in *O. suavis*), ovate to oblong, more rarely linear-oblong or oblong-lanceolate, entire or toothed or waved.

Leaves 2-4 in., ovate-oblong, obtuse, coriaceous, shining
 beneath. Florets 6-12 11. *O. furfuracea*.

Dwarf shrub. Leaves 1-2 in., oblong-ovate, excessively
 coriaceous, silvery beneath. Heads $\frac{1}{2}$ in. diam. Florets
 15-20 12. *O. Allomii*.

Leaves $1\frac{1}{2}$ -3 in., broadly ovate, acute, rather thin, satiny
 beneath. Florets 15-20 13. *O. nitida*.

Leaves 2-4 in., broadly ovate, coriaceous, sharply and
 coarsely toothed 14. *O. macrodonta*.

Leaves 2-4 in., linear-oblong or lanceolate, coriaceous,
 spinous toothed 15. *O. ilicifolia*.

Leaves 2-6 in., broadly ovate, rather thin, toothed, white
 with soft tomentum beneath 16. *O. Cunninghamii*

Leaves $1\frac{1}{2}$ -3 $\frac{1}{2}$ in., oblong-lanceolate, acute, obscurely
 sinuate-dentate 17. *O. excorticata*.

Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., linear-oblong or oblong, obtuse, entire or
 obscurely sinuate 18. *O. suavis*.

*** Leaves alternate, 3-7 in. long, linear or narrow-linear; lateral veins conspicuous beneath, at right angles to the midrib.

Leaves 3-7 in., $\frac{1}{2}$ -1 in. broad, linear or narrow-linear, ferru-
 ginous beneath 19. *O. lacunosa*.

Leaves 5-6 in., $\frac{1}{4}$ in. broad, very narrow-linear 20. *O. alpina*.

**** Leaves alternate, small, $\frac{1}{4}$ - $1\frac{1}{4}$ in. long (longer in *O. oleifolia*), coriaceous, quite entire.

- Leaves $\frac{1}{3}$ - $\frac{2}{3}$ in., obovate-oblong, clothed with soft white tomentum beneath. Florets 12-20 21. *O. moschata*.
 Leaves $\frac{1}{2}$ - $1\frac{1}{4}$ in., oblong or oblong-ovate. Florets 8-10 .. 22. *O. Haastii*.
 Leaves 1-3 in., lanceolate or oblong-lanceolate. Florets 4-8 23. *O. oleifolia*.
 Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., ovate or orbicular-ovate, excessively thick and coriaceous. Heads unknown 24. *O. coriacea*.
 Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., orbicular to oblong. Heads solitary. Florets 6-12 25. *O. nummularifolia*.

C. Heads small, $\frac{1}{8}$ - $\frac{1}{2}$ in. long, narrow, cylindrical, paniced. Florets few, 1-5, rarely more. Leaves large, $1\frac{1}{2}$ -4 in., alternate.

- Leaves $1\frac{1}{2}$ - $2\frac{1}{2}$ in., elliptic, obtuse, undulate. Florets 3-5 .. 26. *O. angulata*.
 Leaves 2-4 in., oblong or ovate-oblong, white beneath, often undulate. Florets 3-6 27. *O. albida*.
 Leaves 2-4 in., elliptic-lanceolate, acute, flat. Florets 2-3 28. *O. avicenniæfolia*.
 Leaves $1\frac{1}{2}$ -3 in., oblong or oblong-ovate, obtuse, undulate. Florets never more than one 29. *O. Forsteri*.

D. Heads small, $\frac{1}{2}$ in. long, crowded in axillary sessile glomerules. Leaves small, alternate or in alternate fascicles.

- Leaves $\frac{3}{4}$ - $1\frac{1}{2}$ in., elliptic-oblong or -lanceolate 30. *O. fragrantissima*.

E. Heads small, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, solitary or fascicled. Leaves opposite or in opposite fascicles, small, $\frac{1}{2}$ - $1\frac{1}{4}$ in. long.

- Leaves $\frac{3}{4}$ - $1\frac{1}{2}$ in., obovate to linear-obovate, thin, membranous. Heads fascicled on slender pedicels. Florets 20-25 31. *O. Hectori*.
 Leaves $\frac{1}{2}$ -1 in., linear-spathulate, coriaceous. Heads fascicled; pedicels short. Involucre viscid and glandular. Florets 20-35 32. *O. odorata*.
 Leaves $\frac{1}{2}$ -1 in., linear-spathulate, coriaceous. Heads fascicled; pedicels slender. Involucre tomentose, not viscid. Florets 6-8 33. *O. laxiflora*.
 Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in., linear-obovate, white beneath. Heads solitary or fascicled, shortly pedicelled or sessile. Florets 5-12 34. *O. virgata*.
 Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., linear or linear-obovate, yellowish beneath. Heads solitary, terminating short lateral branchlets. Florets 8-20 35. *O. Solandri*.

Olearia rigida, Col. in Trans. N.Z. Inst. xx. (1888) 194; Kirk, Students' Fl. 271, is proved by the type specimen in Mr. Colenso's herbarium to be *Senecio Bidwillii*, Hook. f. In a similar manner *O. xanthophylla*, Col. l.c. 193, is shown to be *Cassinia Vauvilliersii*, Hook. f.

1. *O. insignis*, Hook. f. Fl. Nov. Zel. ii. 331. — A low robust spreading shrub 1-6 ft. high, rarely more; branches stout, densely tomentose. Leaves crowded at the ends of the branches, 3-7 in. long, 1-4 in. broad, oblong or oblong-ovate or narrow-obovate, obtuse, equal or unequal at the base, quite entire, excessively thick and coriaceous, glabrous and shining above, under-surface thickly

clothed with white appressed tomentum, becoming fulvous or red when dry, veins evident on both surfaces; petiole $\frac{1}{2}$ –2 in. long, stout. Peduncles 1–5 at the ends of the branches, 4–12 in. long, stout, evenly tomentose, naked or with a few foliaceous bracts immediately below the head. Head large, hemispherical, 2–3 in. diam.; involucral scales imbricated in many series, tomentose. Ray-florets very numerous; ligules narrow, white. Disc-florets yellow. Pappus of one series of equal scabrid hairs thickened at the tips. Achenes long and slender, silky.—*Handb. N.Z. Fl.* 125; *Bot. Mag.* t. 7034; *Kirk, Students' Fl.* 266. *O. marginata*, *Col. in Trans. N.Z. Inst.* xv. (1883) 321.

SOUTH ISLAND: Marlborough, from Blenheim southwards to the Conway and Mason Rivers. Sea-level to 4000 ft. December–January.

A very handsome and remarkable plant, quite unlike any other species. It departs widely from the typical *Olearias* in the large broadly ovoid involucre with the bracts in very many series, and in the pappus of perfectly equal hairs.

2. *O. semidentata*, *Dcne. ex Hook. f. Fl. Nov. Zel.* i. 115.—A small sparingly branched shrub 1–3 ft. high; branches slender, straggling, more or less clothed with white floccose tomentum. Leaves numerous, close-set, ascending or spreading, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, lanceolate or linear-lanceolate, acute, gradually narrowed to a sessile base, somewhat distantly serrate towards the tip, glabrous above or slightly cottony when young, white with appressed floccose tomentum beneath. Peduncles crowded towards the tips of the branches, slender, tomentose, equalling or exceeding the leaves, clothed with numerous small lanceolate bracts. Heads solitary, 1– $1\frac{1}{4}$ in. diam.; involucral scales in about 3 series, acute, cobwebby at the tips. Ray-florets ligulate, purple; disc-florets violet–purple. Achenes linear, grooved, slightly pubescent.—*Hook. f. Handb. N.Z. Fl.* 124; *Buch. in Trans. N.Z. Inst.* vii. (1875) 336, t. xiv.; *Kirk, Students' Fl.* 264. *Eurybia semidentata*, *F. Muell. Veg. Chath. Is.* 21.

CHATHAM ISLANDS: Abundant in moist places, near the margin of woods, &c. *Hangatare*. November–December.

A beautiful little plant, easily recognised by its small size, narrow leaves, slender peduncles, and purple flowers. I am indebted to Mr. Cockayne for a very interesting series of specimens showing the range of variation in the size and shape of the leaves. See his paper on “The Plant-covering of Chatham Island,” *Trans. N.Z. Inst.* xxxiv. 288, for some remarks on the subject.

3. *O. chathamica*, *T. Kirk in Trans. N.Z. Inst.* xxiii. (1891) 444.—A rather stout branching shrub 3–6 ft. high; branches, leaves beneath, and peduncles densely clothed with soft white tomentum. Leaves 1–3 in. long, $\frac{1}{2}$ – $1\frac{1}{2}$ in. broad, very variable in shape, lanceolate or elliptic-lanceolate to oblong-ovate or oblong-obovate, acute, narrowed into a short broad petiole, very thick and coriaceous, closely serrate with short blunt callous teeth; midrib and chief veins usually visible beneath. Peduncles few at the tips

of the branches, usually exceeding the leaves; bracts few, linear or lanceolate. Heads solitary, large, $1\frac{1}{2}$ – $1\frac{3}{4}$ in. diam.; involucral scales more or less concealed with white cobwebby tomentum. Ray-florets ligulate, white or purplish; disc-florets violet-purple. Achenes linear, curved, slightly pubescent.—*Students' Fl.* 264. *O. operina*, *Hook. f. Handb. N.Z. Fl.* 731 (in part). *O. angustifolia*, var., *Hook. f., ex Buch. in Trans. N.Z. Inst.* vii. (1875) 336, t. 15.

CHATHAM ISLANDS: In swampy places on the higher parts of the island and on cliffs, *H. H. Travers!* *Enys!* *Cox!* *Keketerehe.* November–February.

This comes very near to *O. operina* and *O. angustifolia*, but is sufficiently distinct in the broader leaves and more slender peduncles with fewer bracts.

4. *O. operina*, *Hook. f. Fl. Nov. Zel.* i. 114.—A stout sparingly branched shrub 6–12 ft. high; branches, leaves beneath, peduncles, and inflorescence densely clothed with soft white tomentum. Leaves often crowded at the tips of the branches, spreading, 2–4 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, narrow obovate-lanceolate, acuminate, gradually narrowed into a short winged petiole, rigid, very thick and coriaceous, glabrous above; margins with numerous close blunt teeth with callous tips. Peduncles crowded at the ends of the branches, 1–3 in. long, stout, densely clothed with numerous closely imbricating lanceolate or linear obtuse bracts. Heads large, 1 – $1\frac{1}{2}$ in. diam.; involucral scales in 2–3 series, tomentose. Ray-florets white; disc-florets yellow. Achenes $\frac{1}{4}$ in. long, linear, conspicuously ribbed, silky.—*Handb. N.Z. Fl.* 124; *Kirk, Students' Fl.* 264. *Arnica operina*, *Forst. Prodr.* n. 299.

Var. *robusta*, *Kirk, Students' Fl.* 265.—Branches short, stout. Leaves shorter and broader, with more deeply toothed margins. Peduncles shorter and stouter.

SOUTH ISLAND: Sounds of the south-west coast, from Martin's Bay to Preservation Inlet; abundant. December–January.

5. *O. angustifolia*, *Hook. f. Fl. Nov. Zel.* i. 115.—A stout branching shrub or small tree 6–20 ft. high; branches, leaves beneath, and peduncles clothed with soft white tomentum. Leaves 3–5 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, narrow-lanceolate, acuminate, narrowed to the base, sessile, extremely rigid and coriaceous, glabrous and glossy above, irregularly finely crenate-dentate, teeth with hard callous points; midrib and principal nerves evident below. Peduncles crowded at the ends of the branches, stout, shorter than the leaves, clothed with laxly imbricating foliaceous bracts, white beneath. Heads large, $1\frac{1}{2}$ –2 in. diam.; involucral scales in two series, the outer densely tomentose. Ray-florets white; disc-florets purple. Achenes linear, grooved, silky.—*Handb. N.Z. Fl.* 124; *Kirk, Forest Fl.* t. 138; *Students' Fl.* 265.

SOUTH ISLAND: Puysegur Point, *Kirk*; near the Bluff Hill, *Aston*. STEWART ISLAND: Sea-coast south of Paterson's Inlet, *Lyall*, *Kirk!* *Petrie!* *Thomson!* *Titi-a-weka.* November–December.

A very handsome plant, distinguished from *O. operina* by the larger size, narrower and longer leaves with the veins evident beneath, large foliaceous bracts, and larger heads with deep-purple disc-florets. The flowers are highly fragrant.

6. *O. Traillii*, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 372.—A shrub or small tree 10–15 ft. high or more; branches stout, densely clothed with soft white tomentum. Leaves crowded at the tips of the branches, spreading, 3–6 in. long, 1–1½ in. broad, lanceolate or narrow obovate-lanceolate, acuminate, gradually narrowed into a short broad petiole, very thick and coriaceous, glabrous above or slightly cottony when young, clothed with white tomentum beneath; margins irregularly doubly crenate-dentate. Racemes terminal, erect, 4–10 in. long, 3–8-headed; bracts large, leafy, 1–2 in. long; rhachis, peduncles, and under-surface of bracts white with appressed tomentum. Heads 1 in. diam.; involucreal scales in 2–3 series, linear, scarious, villous at the tips. Ray-florets shortly ligulate, white; disc-florets violet-purple. Achenes linear, grooved, silky.—*Forest Fl.* t. 142; *Students' Fl.* 265.

STEWART ISLAND: Near the sea in the southern part of the island, rare and local, *Kirk!* November–December.

A very fine plant, closely allied to *O. Colensoi*, but easily separated by the narrower leaves and rayed flower-heads.

7. *O. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 115, t. 29.—A stout closely branched shrub 4–10 ft. high, more rarely forming a small tree 15–30 ft. or more, with a trunk 12–24 in. diam. Leaves spreading, variable in size and shape, 2–6 in. long, obovate or obovate-oblong to oblong-lanceolate or obovate-lanceolate, acute or rarely obtuse, narrowed into a short stout petiole, excessively thick and coriaceous, acutely irregularly serrate or doubly serrate, glabrous and shining above when mature, cottony when young, under-surface clothed with dense white appressed tomentum. Racemes several at the tips of the branches, tomentose, 3–8 in. long, bearing 4–10 pedicelled heads; bracts loosely placed. Heads ¾–1 in. diam., discoid, dark brownish-purple; involucreal scales in 1–2 series, linear, glabrous or villous at the tips. Florets all tubular; female in a single row, corolla usually 3-lobed; hermaphrodite broader, campanulate above. Achenes grooved, silky.—*Handb. N.Z. Fl.* 124; *Kirk, Forest Fl.* 102; *Students' Fl.* 265.

NORTH ISLAND: Mount Hikurangi, Ruahine Mountains, Tararua Mountains, alt. 3000–5500 ft. SOUTH ISLAND: Common on the mountains on the western side of the Island, descending to sea-level in the sounds of the south-west coast. STEWART ISLAND: Abundant from sea-level to the tops of the hills. *Tupari.* December–January.

A very handsome plant. On the mountains it usually forms a densely branched shrub, but at low levels on Stewart Island it attains the dimensions of a small tree.

8. **O. Lyallii**, *Hook. f. Fl. Nov. Zel.* i. 116.—A robust shrub or small tree, sometimes reaching the height of 30 ft., with a trunk 18–24 in. diam.; branches stout, spreading, densely tomentose. Leaves 4–8 in. long (or more in young plants), elliptic-ovate or orbicular-ovate, abruptly acuminate, shortly petiolate, excessively rigid and coriaceous, white with floccose tomentum above but becoming glabrous when old, under-surface densely clothed with soft white wool; margins irregularly doubly crenate. Racemes terminal, stout, 4–8 in. long; rhachis, pedicels, and bracts clothed with snow-white wool. Heads large, discoid, $1\frac{1}{4}$ – $1\frac{1}{2}$ in. diam., dark-brown; involucral scales numerous, in 4–8 series, linear, villous at the tips. Achenes densely silky.—*Handb. N.Z. Fl.* 125; *Kirk, Students' Fl.* 266. *Eurybia Lyallii*, *Hook. f. Fl. Antart.* ii. 543.

THE SNARES: Abundant, *Kirk*! AUCKLAND ISLANDS: Apparently rare, *Lyall, Bolton, Kirk*!

A magnificent plant, nearly related to *O. Colensoi*, but at once distinguished by the open and far more robust habit, larger and broader leaves, which are tomentose on the upper surface as well as beneath, and by the scales of the involucre being in several series.

9. **O. Buchanani**, *T. Kirk, Students' Fl.* 267.—An erect shrub or small tree; branchlets as thick as a goose-quill, reddish, glabrous. Leaves opposite, 2–4 in. long, elliptic-lanceolate, obtuse, gradually narrowed into a short petiole, quite entire, flat, glabrous above, clothed with thin appressed whitish tomentum beneath; veins finely reticulated above, obscure beneath. Heads small, $\frac{1}{4}$ in. long, in rather loose branched axillary corymbs about equalling the leaves; pedicels slender, pubescent. Involucral scales 8–10, pubescent at the tips. Florets of the ray 3–4, ligulate; of the disc about 4, campanulate above. Achenes short, grooved, pubescent.

NORTH ISLAND: *Buchanan*! The exact locality not known.

Founded on a single specimen in Mr. Kirk's herbarium stated to have been collected by Mr. Buchanan in the year 1870 in some locality in the North Island. It is evidently a distinct species, not closely related to any other. It and *O. Traversii* are the only species found in New Zealand with large opposite leaves.

10. **O. Traversii**, *Hook. f. Handb. N.Z. Fl.* 731.—A small tree 15–30 ft. high, with a trunk 1–2 ft. diam.; bark pale, furrowed; branches tetragonous, clothed with appressed silky tomentum, as are the leaves beneath, branches of the inflorescence, and involucre. Leaves opposite, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, oblong or ovate-oblong to broadly ovate, acute or apiculate, shortly petiolate, quite entire, flat, glabrous above or slightly silky when young. Panicles numerous, axillary, much-branched, shorter or longer than the leaves. Heads numerous, small, $\frac{1}{4}$ in. long, discoid; scales of the involucre few, linear-oblong, obtuse or subacute. Florets 5–15; outer ones female, with a minute tubular corolla with an oblique mouth; central hermaphrodite, campanulate above; style-branches

very short. Pappus 1-seriate. Achenes striate, silky.—*Kirk, Forest Fl.* t. 34; *Students' Fl.* 267. *Eurybia Traversii*, *F. Muell. Veg. Chath. Is.* 19, t. 2.

CHATHAM ISLANDS: Abundant in woods. *Akeake*. October–November.

A well-marked plant, easily recognised by the opposite leaves, axillary panicles, and discoid heads.

11. *O. furfuracea*, *Hook. f. Handb. N.Z. Fl.* 125.—A much-branched shrub or small tree 8–20 ft. high; branches stout, spreading; younger ones terete or grooved, velvety-pubescent. Leaves alternate, 2–4 in. long, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. broad, variable in shape, oblong or elliptic-oblong to ovate-oblong or broad-ovate, obtuse or rarely acute, rounded and often unequal at the base, coriaceous, glabrous above, beneath clothed with densely appressed smooth and silvery tomentum; margins flat or undulate, entire or remotely sinuate-toothed; veins reticulated on both surfaces or obscure beneath; petiole stout, $\frac{1}{2}$ –1 in. long. Corymbs large, much-branched, on long slender peduncles. Heads very numerous, $\frac{1}{3}$ in. long, narrow-turbinate; scales of the involucre in several series, imbricate, oblong, villous or fimbriate. Florets 5–12; ray-florets 2–5, with a short broad ray; disc-florets 3–7. Pappus-hairs often thickened and fimbriate at the tips, outer hairs short. Achenes small, faintly striate, pubescent.—*Kirk, Students' Fl.* 267. *Eurybia furfuracea*, *D.C. Prodr.* v. 267; *Hook. f. Fl. Nov. Zel.* i. 117. *Haxtonia furfuracea*, *A. Cunn. Precur.* n. 440. *Shawia furfuracea*, *Raoul, Choix*, 45. *Aster furfuraceus*, *A. Rich. Fl. Nouv. Zel.* 246.

NORTH ISLAND: Abundant from the North Cape to Hawke's Bay and Taranaki. *Wharangipiro*; *Akepiro*. November–February.

A very common plant to the north of the East Cape, varying greatly in the size, shape, and texture of the leaves, the size of the flower-heads, and the number of florets. Two forms may perhaps be distinguished, one with broad heads containing 8–12 florets, the other with much narrower heads and 4 to 8 florets. To this state Mr. Kirk gives the varietal name of *angustata*.

12. *O. Allomii*, *T. Kirk in Trans. N.Z. Inst.* iii. (1871) 179.—A dwarf sparingly branched shrub 1–3 ft. high; branches stout, and with the inflorescence and leaves beneath clothed with smooth and shining silvery tomentum. Leaves alternate, rather close-set, 1–2 in. long, $\frac{3}{4}$ – $1\frac{1}{2}$ in. wide, oblong-ovate or elliptic-ovate, obtuse, truncate or rounded and often unequal at the base, shortly petiolate, excessively thick and coriaceous; veins reticulated above, midrib prominent below. Corymbs longer than the leaves, branched. Heads large, $\frac{1}{2}$ in. diam., or even more when fully expanded; involucre broadly turbinate; scales laxly imbricate, tomentose, obtuse. Florets 15–20; rays about 8. Pappus-hairs unequal. Achenes grooved, hispid.—*Students' Fl.* 271.

NORTH ISLAND: Great Barrier Island, not uncommon, ascending to 2500 ft., *Kirk*! November–December.

Differs from *O. furfuracea* in the much smaller size, smaller close-set excessively rigid and coriaceous leaves, and especially in the much larger heads with twice the number of florets. I have a plant from Castle Hill, Coromandel, which resembles it in foliage, but forms a large shrub 12 ft. high. A similar form has been gathered by Petrie at Mercury Bay. But both of these have few-flowered heads only slightly larger than those of the typical state of *O. furfuracea*, and are best placed under that species.

13. *O. nitida*, Hook. f. *Handb. N.Z. Fl.* 125.—A much-branched shrub 3–12 ft. high, rarely more; branches stout or slender, often angular. Leaves alternate, variable in size, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, broadly ovate or elliptic-ovate, acute or acuminate, rounded and often unequal at the base, coriaceous or almost membranous, clothed with appressed white and satiny tomentum beneath; margins distinctly or obscurely sinuate-dentate, rarely entire; petiole $\frac{1}{2}$ –1 in. long. Corymbs large, rounded, much-branched, very effuse; branches slender, silky-pubescent. Heads numerous, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, obconic; scales of the involucre laxly imbricating; the outer ovate, pubescent or villous; the inner linear, fimbriate or sparingly silky. Florets 15–20; ray-florets 7–10, with a short broad ray. Pappus-hairs unequal, dirty-white or reddish. Achenes short, broad, silky.—Kirk, *Students' Fl.* 268. *O. populifolia*, Col. in *Trans. N.Z. Inst.* xvii. (1885) 243. *O. suborbiculata*, Col. *l.c.* xviii. (1886) 263. *O. erythropappa*, Col. *l.c.* xxii. (1890) 468. *O. multiflora*, Col. xxvii. (1895) 387. *Eurybia nitida*, Hook. f. *Fl. Nov. Zel.* i. 117. *E. alpina*, Lindl. and Paxton, *Flow. Gard.* ii. 84. *Solidago arborescens*, Forst. *Prodr.* n. 298; A. Rich. *Fl. Nouv. Zel.* 252. *Steiractis arborescens*, D.C. *Prodr.* v. 345. *Shawia arborescens*, Raoul, *Choix*, 45.

Var. *cordatifolia*, Kirk, *Students' Fl.* 268.—Leaves orbicular, cordate at the base, very coriaceous. Heads broadly obconic; involucre scales densely woolly, inner villous at the tips. Florets about 20; those of the ray with long and narrow ligules.

Var. *angustifolia*, Cheesem.—Leaves 2– $3\frac{1}{2}$ in. long, linear-lanceolate to lanceolate or oblong-lanceolate, almost membranous, margins sinuate. Corymbs lax, much-branched. Heads large, $\frac{1}{3}$ in. long; rays long and narrow.

Var. *capillaris*, Kirk, *l.c.*—Small, stout or slender, densely or sparingly branched. Leaves small, $\frac{1}{4}$ –1 in. long, ovate or rounded, membranous or sub-coriaceous, silky above when young. Heads 3–12, in sparingly branched corymbs longer than the leaves; pedicels very slender; involucre scales glabrate or slightly villous. Florets 8–12.—*O. capillaris*, Buch. in *Trans. N.Z. Inst.* iii. (1871) 212.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the East Cape and Taupo southwards. Sea-level to 4000 ft. November–January. Var. *cordatifolia*: Stewart Island, Kirk! Var. *angustifolia*: Ohinemuri Gorge, Thames Valley, T. F. C., Petrie! Var. *capillaris*: Mount Egmont, Adams and T. F. C.; Nelson mountains, H. H. Travers! Dall! source of the Poulter River (Canterbury), Cockayne!

Perhaps the most variable species of the genus, but generally to be recognised in all its forms by the thin white and peculiarly satiny tomentum on the under-surface of the leaves.

14. *O. macrodonta*, *Baker in Gard. Chron.* (1884) i. 604.—A shrub or small tree 5–20 ft. high, with a strong musky fragrance; branchlets clothed with closely appressed tomentum. Leaves alternate, 2–4 in. long, 1–1½ in. broad, ovate or ovate-oblong to narrow-oblong, acute or acuminate, rounded or rarely truncate at the base, rigid and coriaceous, silky above when young but becoming glabrous when mature, beneath clothed with closely appressed white tomentum; margins waved, coarsely and sharply toothed; veins at an obtuse angle to the midrib. Corymbs large, rounded, much-branched. Heads numerous, ¼–½ in. long, campanulate; scales of the involucre few, pubescent or villous. Florets 8–12; ray-florets 3–5, ligules short and narrow; disc-florets 4–7. Pappus-hairs unequal, dirty-white or reddish. Achenes short, grooved, pubescent.—*Bot. Mag.* t. 7065; *Kirk, Students' Fl.* 268. *O. dentata*, *Hook. f. Handb. N.Z. Fl.* 126 (not of *Mench.*). *Eurybia dentata* var. *oblongifolia*, *Hook. f. Fl. Nov. Zel.* i. 118.

NORTH AND SOUTH ISLANDS: In mountain districts from the East Cape and Taupo southwards. 1500–4000 ft. January–February.

A distinct species, at once recognised by the large coarsely toothed leaves.

15. *O. ilicifolia*, *Hook. f. Handb. N.Z. Fl.* 126.—Size and habit of *O. macrodonta*, and with the same musky fragrance. Branchlets stout, sometimes almost glabrous. Leaves alternate, 2–4 in. long, linear or linear-oblong or lanceolate, acute or acuminate, truncate or more rarely rounded at the base, rigid and coriaceous, usually clothed with thin yellowish-white tomentum beneath; margins much and deeply waved, sharply serrate-dentate, teeth hard and spinous; veins spreading at right angles. Inflorescence and heads much as in *O. macrodonta*.—*Kirk, Students' Fl.* 269. *Eurybia dentata* var. *linearifolia*, *Hook. f. Fl. Nov. Zel.* i. 118. *O. multibracteolata*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 242.

Var. *mollis*, *Kirk, Students' Fl.* 269.—Young branchlets, inflorescence, and leaves beneath densely clothed with laxly appressed white or yellowish-white tomentum. Leaves rounded at the base, with much smaller, softer, and less spinous teeth; veins more prominent beneath.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In mountain districts from the East Cape and Taupo southwards. Sea-level to 4000 ft. January–February. Var. *mollis*: *Nelson, Dall!* Teremakau Valley, Westland, *Petrie! Cockayne!*

In its ordinary state this has a very different appearance to *O. macrodonta*, but intermediates are not uncommon.

16. *O. Cunninghamii*, *Hook. f. Handb. N.Z. Fl.* 126.—A shrub or small tree 8–25 ft. high; branches, inflorescence, petioles, and leaves beneath clothed with soft white or buff tomentum. Leaves alternate, 2–6 in. long, very variable in shape, broadly ovate or elliptical to oblong or linear-oblong, acute or rarely obtuse, rounded or narrowed at the base; margins irregularly coarsely toothed;

petioles stout or slender, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long. Panicles very large, wide-spreading, much-branched. Heads numerous, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., campanulate; scales of the involucre in several series, lanceolate or ovate-lanceolate, obtuse or subacute, tomentose or villous or nearly glabrous. Florets 12–24; ray-florets the most numerous; ligules short, broad. Pappus-hairs white or reddish, unequal. Achenes quite glabrous or rarely with a few scattered hairs.—*Kirk, Forest Fl.* t. 114; *Students' Fl.* 269. *Eurybia Cunninghamii*, *Hook. f. Fl. Nov. Zel.* i. 117, t. 30. *Brachyglottis Rani*, *A. Cunn. Precur.* n. 465.

Var. **colorata**, *Kirk, Students' Fl.* 269.—Leaves narrower, oblong-lanceolate to lanceolate. Otherwise as in the type.—*O. colorata*, *Col. in Trans. N.Z. Inst.* xii. (1880) 362.

NORTH AND SOUTH ISLANDS: Abundant in woods from the North Cape to Marlborough and Nelson. Sea-level to 2500 ft. *Heketara*. October–November.

A very variable plant. The leaves are sometimes coarsely toothed and at other times almost entire; the involucral scales vary from linear-oblong and densely tomentose to linear and almost glabrous. Mr. Kirk describes the var. *colorata* as having the scales nearly glabrous, but they are densely tomentose in Mr. Colenso's type specimens and in all others that I have seen.

17. **O. excorticata**, *Buch. in Trans. N.Z. Inst.* vi. (1874) 241.—A small much-branched shrub or small tree 12–15 ft. high, with a trunk 1 ft. in diam.; bark loose, papery; branchlets grooved, and with the panicles, petioles, and leaves beneath clothed with dirty-white or buff tomentum. Leaves alternate, $1\frac{1}{2}$ –4 in. long, $\frac{1}{2}$ –1 in. broad, lanceolate or oblong-lanceolate, acute or acuminate, shortly petiolate, coriaceous, glabrous and finely reticulated above; lateral veins spreading, but hardly at right angles; margins flat, obscurely sinuate-dentate. Panicles longer than the leaves, branched, corymbose; pedicels slender, densely tomentose. Heads numerous, small, $\frac{1}{6}$ – $\frac{1}{5}$ in. long; involucre narrow-turbinate; outer scales small, ovate, tomentose; inner linear-oblong, obtuse, villous at the tips. Florets about 12; ray-florets 5–7. Pappus-hairs slender, in one series. Achenes grooved, hispid.—*Kirk, Students' Fl.* 270.

NORTH ISLAND: *Tararua Mountains, Mitchell!* *Mount Holdsworth, T. P. Arnold!* SOUTH ISLAND: *Mr. H. J. Matthews* has sent specimens from a cultivated plant raised from seed obtained in the Nelson District.

18. **O. suavis**, *Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 409.—A densely branched shrub or small tree 6–18 ft. high; branches stout; branchlets, panicles, and under-surface of leaves clothed with pale-yellowish or fulvous tomentum. Leaves alternate, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, linear-oblong or oblong to ovate, obtuse at both ends, shortly petiolate, coriaceous or almost membranous, entire or obscurely sinuate, glabrous above; lateral veins conspicuous beneath, spreading almost at right angles. Panicles much longer than the leaves, slender, corymbose, much-branched; pedi-

cels slender, tomentose. Heads numerous, small, $\frac{1}{8}$ – $\frac{1}{5}$ in. long; involucre turbinate; scales few, lax, linear-oblong or lanceolate, pubescent or villous. Florets 6–10; florets of the ray 3–6. Pappus-hairs in one series. Achenes linear, striate, pubescent.—*Kirk, Students' Fl.* 272.

SOUTH ISLAND: Nelson—Mountains behind Collingwood, *Dall!* Mount Arthur Plateau, *T. F. C.* 3000–4500 ft. January.

A well-marked plant, distinguished by the pale fulvous tomentum, oblong obtuse leaves, and small heads collected in slender much-branched panicles.

19. *O. lacunosa*, *Hook. f. Handb. N.Z. Fl.* 732.—A stout branching shrub or small tree 5–15 ft. high; branchlets, panicles, petioles, and leaves beneath densely clothed with pale ferruginous tomentum. Leaves alternate, 3–7 in. long, $\frac{1}{3}$ –1 in. broad, narrow-linear or linear-lanceolate to linear-oblong, acute or acuminate, shortly petioled, quite entire or obscurely sinuate-toothed, coriaceous, glabrous and reticulated above; midrib very stout and prominent beneath, lateral veins strong, spreading at right angles and dividing the under-surface into numerous sunken interspaces; margins recurved. Panicles towards the tips of the branches, branched, slender, forming a corymbose mass 4–8 in. diam. Heads numerous, small, $\frac{1}{5}$ in. diam., on slender pedicels; involucre turbinate; scales few, laxly imbricate, tomentose or villous. Florets small, 8–12, about half of them shortly rayed. Achenes grooved, silky.—*Kirk, Students' Fl.* 270.

SOUTH ISLAND: Nelson—Heaphy River and mountains at the source of the Aore, *Dall!* source of the Takaka, Mount Arthur Plateau, Mount Owen, *T. F. C.*; Mount Murchison, *Townson!* Lake Rotoroa, *Travers.* Canterbury—Harper's Pass, *Haast!* Poulter River, *Cockayne!* Westland—Teremakau Valley, *Petrie!* 3000–4500 ft. January–February.

A well-marked plant, easily known by the large linear leaves clothed with rusty tomentum beneath, and transversely rugose from the numerous main veins spreading at right angles to the midrib.

20. *O. alpina*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 215.—A shrub or small tree 8–12 ft. high, with a trunk 6–8 in. diam.; branches, leaves below, and inflorescence covered with pale-buff or brown tomentum. Leaves 5–6 in. long, $\frac{1}{4}$ in. broad, linear, entire; midrib very stout, lateral veins close, diverging at right angles, forming a series of lacunæ on each side of the midrib. Panicles large, much-branched. Heads numerous; involucre turbinate. Flowers not seen. Pappus-hairs reddish.—*Kirk, Students' Fl.* 270.

NORTH ISLAND: Wellington—Tararua Mountains and hills towards Wanganui, *Buchanan.*

I have seen no specimens of this, and the above description is adapted from *Buchanan's*. It is evidently near to *O. lacunosa*, but appears to have narrower leaves.

21. **O. moschata**, Hook. f. *Handb. N.Z. Fl.* 127.—A much-branched shrub 4–12 ft. high, with a strong musky fragrance; branches stout, spreading; branchlets, inflorescence, and leaves beneath clothed with soft white densely appressed tomentum. Leaves alternate, close-set, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, obovate-oblong, obtuse, narrowed into a very short petiole, quite entire, coriaceous, glabrous or slightly pubescent above, veins altogether concealed below; margins flat. Corymbs small, lax or compact, on long axillary peduncles much exceeding the leaves; pedicels slender, tomentose. Heads few, $\frac{1}{4}$ in. long, campanulate or broadly turbinate; scales of the involucre in few series; the outer short, ovate, obtuse, tomentose; the inner linear-oblong, obtuse, pubescent or nearly glabrous. Florets 12–20; ray-florets 6–12, rather long. Achenes ribbed, silky.—*Kirk, Students' Fl.* 271.

SOUTH ISLAND: Canterbury—Arthur's Pass, *Kirk*! Upper Rakaia, *Haast*! Rangitata Valley, *Potts*! Mount Cook district, abundant, *Haast*, *T. F. C.*; Lake Ohau, *Buchanan*! Otago—Lake district, *Hector* and *Buchanan*! Humboldt Mountains, Mount Tyndall, Clinton Saddle, *Petrie*! 2000–4500 ft. January–February.

A distinct species, easily separated from its immediate allies by the small obovate leaves, soft white tomentum, and broad many-flowered heads.

22. **O. Haastii**, Hook. f. *Handb. N.Z. Fl.* 126.—A much-branched shrub 4–8 ft. high; branches stout, hoary with white pubescence. Leaves alternate, crowded, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, oblong or oblong-ovate to elliptic-oblong, obtuse at both ends, shortly petioled, very coriaceous, glabrous and shining above, clothed with white appressed tomentum beneath; lateral veins obscure, spreading, but hardly at right angles. Corymbs numerous, lax or compact, on long naked peduncles much exceeding the leaves. Heads numerous, $\frac{1}{4}$ – $\frac{1}{3}$ in. long; involucre cylindric; scales imbricated, pale straw-colour; outer smaller, broadly ovate, slightly pubescent; inner much larger, linear-oblong, obtuse, nearly glabrous. Florets 8–10; ray-florets 3–5, short, broad. Achenes narrow, grooved, pubescent.—*Bot. Mag.* t. 6592; *Kirk, Students' Fl.* 272.

SOUTH ISLAND: Canterbury—Kowai River, *Petrie*! *T. F. C.*; Upper Rakaia, *Haast*; Rangitata Valley, *Potts*! Ohau Glacier, *Haast*. 1500–4500 ft. December–January.

23. **O. oleifolia**, *T. Kirk in Trans. N.Z. Inst.* xi. (1879) 463.—A much-branched shrub 5–8 ft. high; branches crowded, erect or ascending; branchlets grooved, hoary with fine appressed pubescence. Leaves alternate, $1\frac{1}{2}$ –3 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. wide, lanceolate or oblong-lanceolate, erect, acute or subacute, shortly petioled, very coriaceous, glabrous and finely reticulated above, clothed with white appressed tomentum beneath; veins obscure. Corymbs broad, rather lax, on slender naked peduncles much exceeding the leaves. Heads numerous, $\frac{1}{4}$ – $\frac{1}{3}$ in. long; involucre cylindric; scales imbricate; the outer smaller, slightly tomentose; the inner

longer, linear-oblong, almost glabrous or pubescent at the tips. Florets 4-8; ray-florets 2-4, short, broad. Achenes grooved, pubescent.—*Students' Fl.* 272. *O. angustata*, *Armst. in Trans. N.Z. Inst.* xiii. (1881) 337.

SOUTH ISLAND: Canterbury—Ashburton Mountains, *Potts!* Upper Rangitata, *Armstrong!* Otago—Resolution Island and Preservation Inlet, *Enys!* 1500-3500 ft. January.

Only differs from *O. Haastii* in the more erect habit and longer and narrower leaves. Intermediate forms have been collected, but the usual aspect of the plant is distinct.

24. *O. (?) coriacea*, *Kirk, Students' Fl.* 276.—A sparingly branched rigid shrub 6-8 ft. high; branches erect or ascending, rather stout, pubescent. Leaves alternate, $\frac{1}{2}$ - $\frac{2}{3}$ in. long, ovate or orbicular-ovate, obtuse, shortly petiolate, excessively thick and coriaceous, glabrous above, white with appressed tomentum beneath; margins recurved. Flowers not seen, but the peduncles of the previous year's inflorescence are about twice as long as the leaves, and are apparently branched at the top.

SOUTH ISLAND: Marlborough—Awatere Valley and Mount Fyffe, *Kirk!*

Apparently a very distinct species, the exact position of which must remain doubtful until flowering specimens have been obtained.

25. *O. nummularifolia*, *Hook. f. Handb. N.Z. Fl.* 127.—A much and closely branched shrub 2-10 ft. high; branches stout, woody, scarred; younger ones often viscid, more or less clothed with whitish or yellowish stellate tomentum or almost glabrous. Leaves alternate, close-set, erect or spreading, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, almost orbicular to broadly oblong or obovate, rounded at the tip, very shortly petiolate, excessively thick and coriaceous, shining and reticulate above, clothed with appressed stellate tomentum beneath; margins recurved. Heads $\frac{1}{3}$ - $\frac{1}{2}$ in. long, solitary, on axillary peduncles longer or shorter than the leaves. Involucre narrow-turbinate; scales in several series, closely imbricating, tomentose or pubescent or almost glabrous; outer short and broad; inner linear, obtuse. Florets 6-12; ray-florets 3-5, rather broad. Achenes pubescent.—*Kirk, Students' Fl.* 273. *O. Hillii*, *Col. in Trans. N.Z. Inst.* xx. (1888) 194. *Eurybia nummularifolia*, *Hook. f. Fl. Nov. Zel.* i. 118.

Var. *cymbifolia*, *Hook. f. Handb. N.Z. Fl.* 732.—Leaves spreading or deflexed, oblong, obtuse, convex above, margins much revolute all round, hence boat-shaped with the cavity beneath; more or less clothed with white stellate tomentum. Heads as in the typical form, but scales usually more tomentose.

NORTH AND SOUTH ISLANDS: Mountain districts from the East Cape and Taupo to Foveaux Strait, but local to the south of Lake Wanaka. Altitudinal range from 2000 ft. to 4500 ft., but descending to sea-level in Colac Bay, Southland. Var. *cymbifolia*: Mountain districts in the South Island, but local; most plentiful in Nelson and Marlborough.

A variable plant, especially in the size and shape of the leaves, the extent to which the leaf-margins are revolute, the size of the heads, and the number of florets. There is a specimen in Mr. Petrie's herbarium with the heads collected in 3-5-flowered corymbs.

26. *O. angulata*, *T. Kirk in Trans. N.Z. Inst.* xiii. (1881) 384. —A much-branched shrub 8–12 ft. high; branches short, spreading, grooved, almost hoary. Leaves alternate, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, 1 in. broad, oblong or broadly elliptic, rounded at the apex, truncate at the base, shortly petioled, coriaceous, clothed with appressed white tomentum beneath; margins undulate. Panicles spreading, exceeding the leaves. Heads $\frac{1}{5}$ in. long; involucral scales laxly imbricating; the lower farinose; the upper linear, obtuse, ciliate or pubescent. Florets 3–5. Pappus-hairs unequal. Achenes strigose.—*Students' Fl.* 273.

NORTH ISLAND: Spirits Bay, North Cape district, *Kirk*! April–May.

This only differs from *O. albida* in the shorter and broader much more waved leaves, and, in my opinion, would have been best treated as a form of that plant.

27. *O. albida*, *Hook. f. Handb. N.Z. Fl.* 128.—A small tree 10–20 ft. high; branchlets grooved, more or less hoary with white tomentum. Leaves alternate, quite entire, 2–4 in. long, oblong or ovate-oblong, obtuse or subacute, rounded or narrowed at the base, petiolate, coriaceous, farinose above when young, glabrous when old, clothed with soft white appressed tomentum beneath; margins undulate or nearly flat. Panicles large, broad, with spreading branches; pedicels short, tomentose or farinose. Heads numerous, $\frac{1}{4}$ in. long, subcylindric; involucral scales imbricate, farinose or tomentose; the outer short, obtuse; the inner linear-oblong, often ciliate. Florets 3–6; ray-florets 1–3. Pappus-hairs unequal, thickened at the tips. Achenes linear, grooved, pubescent.—*Kirk, Students' Fl.* 273. *Eurybia albida*, *Hook. f. Fl. Nov. Zel.* i. 118.

NORTH ISLAND: North Cape to Taranaki and the East Cape, usually near the sea, but not common. April–May.

28. *O. avicenniæfolia*, *Hook. f. Handb. N.Z. Fl.* 127. — A small branching tree 8–20 ft. high; branchlets grooved and angular, more or less hoary with fine white tomentum. Leaves alternate, quite entire, 2–4 in. long, elliptic-lanceolate or oblong-lanceolate, subacute, narrowed into a rather long petiole, coriaceous, glabrous above, clothed with thin closely appressed white or buff tomentum beneath; veins finely reticulated, conspicuous on both surfaces; margins flat. Corymbs large, much-branched, long-peduncled, usually exceeding the leaves. Heads very numerous, small, $\frac{1}{6}$ – $\frac{1}{5}$ in. long, narrow; involucre cylindric; scales few, imbricate, glabrous or minutely pubescent. Florets 2 or 3, rarely 4; ray-florets 1 or rarely 2, sometimes wanting. Pappus-hairs in one series. Achenes silky.—*Kirk, Forest Fl.* t. 111; *Students' Fl.* 274. *Eurybia avicenniæfolia*, *Hook. f. Fl. Nov. Zel.* i. 120. *Shawia avicenniæfolia*, *Raoul, Choix*, 19.

SOUTH ISLAND, STEWART ISLAND: Abundant throughout, ascending to 3000 ft. *Akeake*. January–February.

29. **O. Forsteri**, *Hook. f. Handb. N.Z. Fl.* 127.—A much-branched shrub or small tree 8–20 ft. high; branchlets grooved and angular, tomentose. Leaves alternate, $1\frac{1}{2}$ –3 in. long, oblong or ovate-oblong or broadly ovate, obtuse, shortly petiolate, coriaceous, glabrous above, clothed with thin closely appressed white tomentum beneath; veins finely reticulate; margins usually strongly undulate. Corymbs branched, peduncles usually shorter than the leaves. Heads sessile and fascicled on the branches of the corymb, small, narrow, $\frac{1}{5}$ – $\frac{1}{5}$ in. long. Involucre cylindric; scales few, imbricate, glabrous or nearly so; outer small, broadly ovate; inner much longer, linear-oblong, obtuse. Florets always solitary, tubular, hermaphrodite. Pappus-hairs numerous, in one series. Achenes rather broad, pubescent.—*Kirk, Forest Fl.* t. 137. *O. uniflora*, *Col. in Trans. N.Z. Inst.* xxii. (1888) 469. *Eurybia Forsteri*, *Hook. f. Fl. Nov. Zel.* i. 119. *Shawia paniculata*, *Forst. Char. Gen.* 95, t. 48; *A. Rich. Fl. Nouv. Zel.* 243; *A. Cunn. Precur.* n. 434; *Raoul, Choix*, 18, t. 13; *Kirk, Students' Fl.* 277.

Var. **elliptica**, *Kirk, l.c.*—Leaves narrower, linear-oblong or elliptic-oblong.

NORTH AND SOUTH ISLANDS: From the East Cape southwards to Oamaru and Greymouth; often local, usually near the coast. Sea-level to 1500 ft. *Akiraho.* April–May.

The heads never contain more than one floret, which is invariably tubular and hermaphrodite. On account of the constancy of this character Mr. Kirk has proposed to revive Forster's genus *Shawia*, but, I think, quite unnecessarily. In *O. avicenniaefolia* the florets are sometimes reduced to 2, and occasionally there is no ray-floret, thus absolutely bridging over the gap between *O. Forsteri* and the remaining *Olearia*.

30. **O. fragrantissima**, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 398.—An erect much-branched shrub 6–15 ft. high or more; bark dark red-brown or almost black; branches rigid, flexuous or zigzag, finely grooved. Leaves distant, alternate, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, elliptic-lanceolate to elliptic-oblong or -ovate, acute, narrowed into a rather slender petiole, membranous, glabrous above, clothed with rather lax silky tomentum beneath; margins flat, quite entire. Inflorescence of alternate sessile glomerules $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., each containing 8–12 nearly sessile heads $\frac{1}{5}$ in. long, each head with a woolly bract at its base. Involucral bracts in 2 or 3 series, oblong, obtuse, densely woolly. Florets 4–8, yellowish; ray-florets 2–5, short and broad. Achenes grooved, silky.—*Kirk, Students' Fl.* 274.

SOUTH ISLAND: Canterbury—Lake Forsyth, *Kirk!* Otago—Otago Heads, *Buchanan!* *Petrie!* near Dunedin, Catlin's River, *Petrie!* November–December.

A very distinct species, remarkable for the heads being congested into globose fascicles or glomerules. The flowers are deliciously fragrant, smelling like ripe peaches.

31. **O. Hectori**, *Hook. f. Handb. N.Z. Fl.* 128.—An erect much-branched deciduous shrub 5–15 ft. high; branches slender, grooved, glabrous; bark dark red-brown. Leaves in opposite fascicles, variable in size and shape, $\frac{3}{4}$ –1½ in. long, linear-obovate or linear-spathulate to oblong or obovate, obtuse, narrowed into a slender petiole, thin and membranous, glabrous above when mature, silky when young, beneath clothed with thin silvery tomentum; margins flat, entire. Heads in opposite fascicles of 2–5; peduncles $\frac{1}{4}$ –½ in. long, slender, drooping, silky. Involucre broad and shallow, cup-shaped; bracts in 2 series, lax, spreading, linear-oblong or -obovate, obtuse, woolly. Florets 20–25; ray-florets 12–17, small, with a narrow ray; disc-florets about 8, much larger, mouth funnel-shaped. Achenes linear-obovoid, grooved, silky.—*Kirk, Students' Fl.* 274.

SOUTH ISLAND: Marlborough—Pelorus Sound, *Rutland!* Canterbury—Bank Peninsula, *J. B. Armstrong.* Otago—Lake district, *Hector* and *Buchanan*; Kaitangata, Catlin's River, Invercargill, Kawarau Gorge, Matukituki Valley, *Petrie!* Sea-level to 2500 ft. October–November.

32. **O. odorata**, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 399.—An erect much-branched shrub 6–12 ft. high; branches divaricating, stout, terete, grooved. Leaves opposite, usually fascicled, $\frac{1}{3}$ –1 in. long, linear-spathulate or linear-obovate, rounded at the tip, narrowed into very short petioles or almost sessile, coriaceous, glabrous or silky above, clothed with soft white tomentum beneath; margins flat, entire. Heads in opposite fascicles of 2–5 on short arrested branchlets; peduncles short, stout, silky. Involucre broadly campanulate; bracts in 3–4 series, linear-oblong, obtuse, dark-brown, viscid and glandular. Florets numerous, 20–35; ray-florets 8–18, short; corolla of disc-florets viscid and glandular. Achenes silky.—*Kirk, Students' Fl.* 275.

SOUTH ISLAND: Mountain districts in Canterbury, Westland, and Otago; not uncommon. 1000–3000 ft. January–February.

Closely allied to *O. virgata*, but distinguished by the terete branchlets, larger leaves, many-flowered heads, and viscid and glandular involucre bracts.

33. **O. laxiflora**, *T. Kirk, Students' Fl.* 275.—A large erect much-branched shrub 6–12 ft. high; branches slender, divaricating, sometimes almost pendulous, terete or obscurely tetragonous. Leaves opposite or in opposite fascicles, $\frac{1}{2}$ –1 in. long, narrow linear-spathulate or linear-oblong, obtuse, narrowed into very short petioles, coriaceous, glabrous above, beneath clothed with closely appressed white tomentum. Heads numerous, 5–15, in opposite fascicles on short arrested branchlets; peduncles slender, $\frac{3}{4}$ in. long, glabrate or silky. Involucre campanulate; bracts few, lax, linear-oblong, villous at the tips. Florets 6–8; ray-florets 3–4, broad. Achenes grooved, silky.

SOUTH ISLAND: Westland—Hokitika, *H. Tipler!*

Very similar to *O. odorata* in habit and appearance, but the fascicles are larger and much more lax, the peduncles longer, the involucre bracts not viscid nor glandular, and the florets much fewer in number. I have only seen two specimens.

34. *O. virgata*, Hook. f. *Handb. N.Z. Fl.* 128.—An erect much-branched shrub 4–10 ft. high, often forming dense thickets; branches spreading, stout or slender, tetragonous or almost terete, smooth or grooved, glabrous or pubescent when young; bark dark red-brown. Leaves opposite or in opposite fascicles, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-obovate or linear-spathulate, obtuse, narrowed into a short petiole or sessile, coriaceous, glabrous or silky above, clothed with white appressed tomentum beneath. Heads solitary or fascicled, on short arrested opposite branchlets, shortly pedunculate or almost sessile. Involucre broadly turbinate; bracts in about 3 series, linear-oblong, tomentose or villous or almost glabrous. Florets 5–12; ray-florets 3–6, short, slender; disc-florets often with villous tips to the corolla-lobes. Achenes small, linear, glabrous or slightly pubescent.—Kirk, *Students' Fl.* 275. *O. quinquefida*, Col. in *Trans. N.Z. Inst.* xxviii. (1896) 596. *O. aggregata*, Col. l.c. 597. *O. parvifolia*, Col. l.c. 598. *Eurybia virgata*, Hook. f. *Fl. Nov. Zel.* i. 119.

Var. *ramuliflora*, Kirk, *Students' Fl.* 276.—Leaves in opposite fascicles of 2–6, rather larger, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, flat. Heads more numerous, in fascicles of 2–6; peduncles slender, often $\frac{1}{4}$ in. long or more, silky. Involucres tomentose or villous. Florets 7–12.—*O. ramuliflora*, Col. in *Trans. N.Z. Inst.* xxii. (1890) 467.

Var. *lineata*, Kirk, *Students' Fl.* 276.—Branchlets more slender, spreading, often silky-pubescent. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, very narrow-linear, glabrate or silky above, tomentose beneath; margins much revolute. Heads fascicled; peduncles slender, silky. Involucre villous or tomentose. Florets 12–20.

NORTH AND SOUTH ISLANDS: From the Thames Valley and Rotorua southwards; not uncommon. Sea-level to 3000 ft. December–January.

35. *O. Solandri*, Hook. f. *Handb. N.Z. Fl.* 128.—An erect much-branched shrub 5–15 ft. high; branches stout, spreading, angled, often viscid, usually more or less clothed with pale-yellowish pubescence. Leaves of young plants opposite, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, linear-obovate or -spathulate, narrowed into short petioles, membranous, flat, white beneath; of mature plants in opposite fascicles, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, narrow-linear or linear-obovate, obtuse, narrowed into very short petioles, coriaceous, glabrous above, beneath clothed with pale-yellowish tomentum; margins recurved. Heads $\frac{1}{4}$ – $\frac{1}{3}$ in. long, solitary, sessile, terminating short lateral branchlets. Involucre narrow-turbinate; scales in 3–4 series, numerous, imbricate, obtuse or subacute, bright fulvous, pubescent or viscid. Florets 8–20; ray-florets 5–14, ray short. Achenes grooved, pubescent.—Kirk, *Students' Fl.* 276. *O. fasciculifolia*, Col. in *Trans. N.Z. Inst.* xxv. (1893) 330. *O. consimilis*, Col. l.c. xxviii. (1896) 596. *Eurybia Solandri*, Hook. f. *Fl. Nov. Zel.* i. 119.

NORTH ISLAND: From the North Cape southwards, plentiful near the coast. SOUTH ISLAND: D'Urville Island, *Bryant*; Queen Charlotte and Pelorus Sounds, *Rutland*! *MacMahon*. Sea-level to 1000 ft. February-May.

5. **PLEUROPHYLLUM**, Hook. f.

Tall handsome silky robust perennial herbs. Leaves mostly radical, large, entire, many-nerved. Heads large, racemed at the top of the stem. Involucre broadly campanulate or hemispherical; bracts in 2-3 series, herbaceous. Receptacle flat, pitted. Ray-florets female, ligulate, in 1-3 series; ligule long or short. Disc-florets many, regular, tubular, campanulate at the mouth, 4-5-toothed. Anthers shortly and obtusely auricled at the base. Style-branches of the disc-florets flattened, with lanceolate tips. Achenes compressed, striated, densely setose. Pappus-hairs in 2-3 series, copious, rigid, scabrid, unequal.

The genus is limited to the three following species, and is confined to the outlying islands to the south of New Zealand. It is very closely allied to *Celmisia*, from which it is separated rather by the very distinct and peculiar habit than by any structural characters of importance.

Ray-florets with a conspicuous ray. Leaves large, 6-18 in., sessile by a broad base	1. <i>P. speciosum</i> .
Ray-florets short, inconspicuous. Leaves large, 1-4 ft., petiolate, green above	2. <i>P. criniferum</i> .
Ray-florets short, inconspicuous. Leaves smaller, 6-12 in., petiolate, white and silvery on both surfaces	3. <i>P. Hookeri</i> .

1. ***P. speciosum***, Hook. f. *Fl. Antarct.* i. 31, t. 22, 23.—Leaves chiefly radical, spreading horizontally all round the base of the stem, 6-18 in. long, 4-10 in. broad, broadly ovate or obovate, sessile by a broad base, thick and coriaceous, quite entire, furnished with 15-20 stout longitudinal parallel ribs, villous and tomentose beneath, above slightly setose, with the bristles more or less mixed with moniliform hairs. Cauline leaves few, oblong-lanceolate. Flowering-stems several, $1\frac{1}{2}$ -3 ft. high, ending in a raceme of 8-20 heads; bracts numerous, linear. Heads $1\frac{1}{2}$ -2 $\frac{1}{2}$ in. diam.; disc-florets dark-purple; ray-florets with a conspicuous ligule, light-purple or almost whitish. Achenes densely silky-strigose. Pappus-hairs not thickened at the tips.—*Handb. N.Z. Fl.* 129; *Kirk in Trans. N.Z. Inst.* xxiii. (1891) 433; *Students' Fl.* 277.

AUCKLAND AND CAMPBELL ISLANDS: Abundant from sea-level to nearly 1000 ft. December-January.

A truly noble plant, at once recognised by the large purple heads with conspicuous spreading rays.

2. ***P. criniferum***, Hook. f. *Fl. Antarct.* i. 32, t. 24, 25.—Radical leaves variable in size and shape, 1-4 ft. long, 4-12 in. broad, orbicular-ovate or broadly oblong to ovate-lanceolate or obovate-lanceolate, acute, narrowed into a sheathing petiole of variable length, firm but membranous, clothed with thin white tomentum

beneath, above setose with moniliform hairs intermixed; principal nerves 8-16, parallel, but following the outline of the leaf; margins remotely and minutely spinulose-serrate. Cauline-leaves smaller and narrower, sessile, clothed with thin white tomentum on both surfaces. Flowering-stem stout, 2-6 ft. high; raceme of 15-30 heads or more. Heads subglobose, discoid, 1-1½ in. diam., purple; involucral bracts ovate-lanceolate, margins ciliate. Ray-florets with a very short and inconspicuous 2-3-fid ligule. Achenes silky-strigose. Pappus-hairs slightly thickened at the tips.—*Handb. N.Z. Fl.* 129; *Kirk in Trans. N.Z. Inst.* xxiii. (1891) 434. *P. Hombronii*, *Dcne. in Voy. Astrol. et Zél.* 36. *Albinea origenesa*, *Homb. & Jacq. Voy. Astrol. et Zél.* 37, t. 4.

AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant from sea-level to over 1000 ft. December-January.

Separated from the preceding by the petiolate leaves and subglobose discoid heads. Kirk has pointed out that the plate in the "Flora Antarctica," excellent in most respects, is faulty in the leaf figured not being that of the present species, but of *P. speciosum*.

3. *P. Hookeri*, *Buch. in Trans. N.Z. Inst.* xvi. (1884) 395 (excl. t. 37).—Leaves all radical, 6-12 in. long, 3-4 in. broad, obovate or oblong-obovate, acute or acuminate, narrowed into a short broad petiole, coriaceous, clothed on both surfaces with rather loose white and silvery tomentum; principal nerves 8-12, slender; margins entire or minutely denticulate. Flowering-stems 1-3, 1½-2 ft. high, strict, silky-tomentose, naked below excepting for 1-3 narrow-linear bracts; raceme of 12-24 heads. Heads subglobose, discoid, ¾ in. diam.; involucral bracts narrow-linear, acuminate. Ray-florets few, with a very short and inconspicuous 2-lobed ligule. Achene silky. Pappus-hairs hardly thickened above.—*Kirk, Students' Fl.* 278. *P. Hookerianum*, *Kirk in Trans. N.Z. Inst.* xxiii. (1891) 435. *P. Gilliesianum*, *Kirk in Rep. Austral. Assoc.* (1891) 220.

AUCKLAND ISLANDS: *Kirk!* CAMPBELL ISLAND: *Buchanan!* *Kirk!* MACQUARIE ISLAND: *Scott, Hamilton!* 500-1000 ft. December-January.

Closely allied to the preceding, but sufficiently distinct in the smaller size, leaves silvery-tomentose on both surfaces, rigid scapes, and smaller heads.

6. CELMISIA, Cass.

Perennial herbs, usually tufted or with a short creeping rhizome, rarely with a procumbent or suberect branched stem. Leaves all radical and rosulate, or cauline and densely imbricated, narrowed into a sheathing base, usually clothed beneath with appressed white or buff tomentum. Scapes or peduncles long or short, rarely almost wanting, bracteate. Heads large, solitary, radiate. Involucre broadly hemispherical; bracts imbricated in several or many series, narrow, pubescent or cottony or glandular. Receptacle flat or convex, pitted. Ray-florets female, in a single row, ligulate;

ligule spreading, flat or revolute, often long, always white. Disc-florets numerous, hermaphrodite, tubular, 5-lobed. Anthers usually sagittate at the base, with short tails. Style-branches flattened, tipped with long or short appendages. Achenes linear, slightly compressed or angled, with 1-3 prominent ribs on each side. Pappus copious, of numerous unequal scabrid bristles.

The genus *Celmisia*, which is confined to New Zealand, with the exception of one species found in Australia and Tasmania, forms one of the chief ornaments of the montane and alpine flora of the colony, the various species usually composing a large proportion of the vegetation, especially in the South Island, where the mountain slopes and valleys are often whitened for miles from the abundance of their large daisy-like flowers. With few exceptions, the species are exceedingly variable and difficult of discrimination. This is especially the case with *C. longifolia*, *coriacea*, *discolor*, *petiolata*, and *spectabilis*, all of which run into forms which are easily distinguishable by the eye, and which to some extent may be permanent, but which it is almost impossible to define in precise language, and which in most cases are connected by numerous intermediates. As the flower-heads are very similar throughout the genus, except in size, the specific characters are almost wholly founded on the vegetative organs. The size, shape, and texture of the leaves, the nature of the tomentum clothing the under-surface, the differences in the leaf-sheaths, the length, stoutness, and indumentum of the scapes, and the peculiarities of the involucre bracts are all made use of. Of course, these are essentially variable characters, and can only be safely employed in combination. But in *Celmisia*, as in other large genera of the New Zealand flora, the species, such as they are, must be regarded as founded on an aggregation of several small prevalent characters rather than on conspicuous and important differences.

A. Suffruticose. Stems woody, branched; branches elongated. Leaves imbricated along the branches.

- | | |
|--|--------------------------|
| Stems 1-4 ft., procumbent or suberect. Leaves spreading, 1-1½ in., linear, acute; margins flat | 1. <i>C. Walkeri</i> . |
| Stems 1-3 ft., prostrate. Leaves ½-1 in., linear-spathulate, obtuse; margins revolute | 2. <i>C. rupestris</i> . |
| Stems 6-12 in., slender, sparingly branched. Leaves laxly imbricating, spreading or reflexed, ½-¾ in., lanceolate, sparsely clothed with lepidote scales beneath | 3. <i>C. Gibbsii</i> . |
| Stems 2-8 in., sparingly branched. Leaves erect, ¼-½ in. long, linear-oblong, white and cottony beneath | 4. <i>C. ramulosa</i> . |
| Stems 3-12 in., much-branched. Leaves ¼-½ in., linear-subulate, green on both surfaces, glabrous or glandular | 5. <i>C. lateralis</i> . |

B. Herbaceous, sometimes woody at the base. Branches short. Leaves crowded, usually more or less rosulate. Disc-florets yellow, never purple.

* Leaves more or less toothed or serrate, clothed with white or buff tomentum beneath (glabrate in *C. prorepens*).

- | | |
|--|-----------------------------|
| Leaves 6-12 in. × 1½-2½ in., lanceolate, acutely serrate, white beneath. Scape 1-2 ft., with linear bracts | 6. <i>C. holosericea</i> . |
| Leaves 4-8 in. × 1-2 in., obovate-lanceolate, acutely serrate, buff beneath. Scape 6-18 in., with broad leafy bracts | 7. <i>C. Dallii</i> . |
| Leaves 1-5 in. × ½-1 in., obovate-oblong to linear-oblong, serrulate, buff beneath. Scape 2-10 in., with linear bracts | 8. <i>C. hieracifolia</i> . |
| Leaves 1½-3 in. × ½-1 in., linear-oblong to linear-obovate, green on both surfaces, rugose above | 9. <i>C. prorepens</i> . |

- Leaves 3-7 in. \times $\frac{3}{4}$ -1 $\frac{1}{2}$ in., linear-oblong, crenate-dentate, white beneath. Scapes 6-18 in. Involucral bracts very numerous 10. *C. densiflora*.
- Leaves $\frac{1}{2}$ -2 $\frac{1}{2}$ in. \times $\frac{1}{4}$ - $\frac{1}{2}$ in., spatulate to linear, viscid, coriaceous, white beneath. Scapes slender.. .. 11. *C. discolor*.
- Leaves 1-2 $\frac{1}{2}$ in. \times $\frac{1}{2}$ - $\frac{3}{4}$ in., obovate-spathulate, plaited above, clothed with lax soft white tomentum beneath or on both surfaces.. .. 12. *C. incana*.
- Leaves 1 $\frac{1}{2}$ -3 in. \times $\frac{1}{2}$ -1 in., oblong to oblong-spathulate, greenish-grey and plaited above, white beneath; margins revolute. Scapes with numerous linear bracts .. 13. *C. Haastii*.
- Leaves 3-8 in. \times $\frac{1}{4}$ -1 in., linear-oblong or lanceolate, dark-green above, white beneath, coriaceous. Scape slender, flexuose, glabrate 14. *C. Lindsayi*.
- Leaves 1-3 in. \times $\frac{1}{4}$ - $\frac{3}{4}$ in., oblong or spatulate, dull-green above, white with thin appressed tomentum beneath or glabrous, membranous 15. *C. Sinclairii*.

** Leaves entire (or if toothed very obscurely so), clothed with white or buff tomentum beneath (glabrate in *C. Mackaui*).

† Leaves 3-16 in. \times $\frac{1}{4}$ -2 $\frac{1}{2}$ in., oblong or oblong-lanceolate or linear-oblong, coriaceous or almost membranous, not rigid.

- Leaves 6-16 in. \times 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ in., oblong or oblong-lanceolate, under-surface with velvety ferruginous tomentum; sheaths snow-white 16. *C. Traversii*.
- Leaves 3-9 in. \times 1-2 in., ovate-oblong or oblong, cordate at the base, under-surface with red-brown velvety tomentum; sheaths brown or purple.. .. 17. *C. cordatifolia*.
- Leaves 4-14 in. \times $\frac{3}{4}$ -2 in., oblong to oblong-lanceolate or linear-oblong, under-surface with appressed white tomentum or almost glabrous; midrib and petiole purple 18. *C. petiolata*.
- Leaves 3-12 in. \times $\frac{3}{4}$ -2 $\frac{1}{2}$ in., oblong to oblong-lanceolate, under-surface with white satiny tomentum; sheaths snow-white 19. *C. Rutlandii*.
- Leaves 3-6 in. \times $\frac{1}{4}$ -1 in., linear-oblong, under-surface with thick densely matted white or buff woolly tomentum; sheaths snow-white 20. *C. spectabilis*.
- Leaves 1 $\frac{1}{2}$ -3 in., oblong or linear-oblong, acute at both ends, under-surface with soft white tomentum; sheaths slightly cottony 21. *C. dubia*.

†† Leaves 6-24 in. \times $\frac{3}{4}$ -4 in., lanceolate or oblong-lanceolate, coriaceous but not rigid.

- Leaves 8-20 in. \times 1 $\frac{1}{2}$ -3 in., lanceolate or spatulate-lanceolate, under-surface with soft white or buff tomentum. Achene glabrous 22. *C. verbascifolia*.
- Leaves 6-10 in. \times 1-2 in., lanceolate or oblong-lanceolate, under-surface with thin whitish tomentum. Achene silky 23. *C. Brownii*.
- Leaves 6-20 in. \times 2-4 in., lanceolate, acuminate, glabrous on both surfaces, or very slightly cottony beneath .. 24. *C. Mackaui*.
- Leaves 6-24 in. \times $\frac{3}{4}$ -3 in., lanceolate, acute, above coated with a thin pellicle, beneath with appressed silvery tomentum. Achene pilose 25. *C. coriacea*.

††† Leaves 3-18 in. $\times \frac{1}{12}$ - $\frac{3}{4}$ in., narrow-linear to linear or linear-lanceolate or linear-ensiform.

a. Leaves very rigid and coriaceous.

- Leaves 6-18 in. $\times \frac{1}{4}$ - $\frac{3}{8}$ in., ensiform, acute, ribbed above, beneath with satiny appressed tomentum. Midrib very stout 26. *C. Armstrongii*.
 Leaves 6-18 in. $\times \frac{1}{2}$ - $\frac{3}{4}$ in., dagger-shaped, narrowed to an acuminate rigid tip, upper surface with 2 stout longitudinal plaits, white and silvery beneath; midrib not evident 27. *C. Petriei*.
 Leaves 9-18 in. $\times \frac{1}{4}$ - $\frac{1}{3}$ in., narrow-ensiform, tapering into an almost pungent point, even or finely grooved above, white beneath 28. *C. Lyallii*.
 Leaves 3-5 in. $\times \frac{1}{4}$ in., linear, viscid, grooved on both surfaces, white with appressed tomentum beneath. Scape and involucre viscid 29. *C. viscosa*.

b. Leaves not rigid, coriaceous or almost membranous.

- Leaves 3-12 in. $\times \frac{1}{3}$ - $\frac{3}{4}$ in., linear-lanceolate, coriaceous, grooved above, white with appressed tomentum beneath. Scape stout, and with the involucre woolly and cottony 30. *C. Monroi*.
 Leaves 6-18 in. $\times \frac{1}{2}$ -1 in., linear-lanceolate, membranous, flat above, with soft white tomentum beneath. Scape slender, and with the involucre glabrate or slightly cottony 31. *C. Adamsii*.
 Leaves 3-18 in. $\times \frac{1}{12}$ - $\frac{1}{3}$ in., narrow-linear, coriaceous or membranous; margins recurved or flat. Scape usually slender 32. *C. longifolia*.

†††† Small species. Leaves $\frac{1}{2}$ -3 in. $\times \frac{1}{20}$ - $\frac{1}{8}$ in. (sometimes 3-4 in. in *C. linearis*), variable in shape.

- Leaves 1-4 in. $\times \frac{1}{8}$ - $\frac{1}{2}$ in., narrow-linear; margins recurved. Scape stout, densely woolly 33. *C. linearis*.
 Leaves $\frac{1}{3}$ -1 in. $\times \frac{1}{20}$ -1 in., acerose, pungent, silvery beneath. Scape very slender 34. *C. laricifolia*.
 Leaves $\frac{1}{3}$ -1 in. $\times \frac{1}{8}$ - $\frac{1}{2}$ in., linear-spathulate, silky on both surfaces. Scape stout, tomentose and villous 35. *C. Hectors*.
 Leaves 1-1 $\frac{1}{2}$ in. $\times \frac{1}{4}$ - $\frac{1}{3}$ in., linear-oblong, clothed with long silky hairs on both surfaces. Scape stout, densely villous 36. *C. Macmahoni*.
 Leaves $\frac{1}{3}$ -1 in. $\times \frac{1}{8}$ - $\frac{1}{4}$ in., lanceolate, acute, white beneath. Scape slender, glabrate or slightly cottony 37. *C. parva*.

††††† Small, densely tufted species. Leaves $\frac{1}{2}$ -1 in., very narrow-linear, densely imbricating round the stem and forming a hard rosette. Heads sessile among the uppermost leaves.

- Leaves $\frac{1}{3}$ -1 in. $\times \frac{1}{12}$ in., linear-subulate. Head $\frac{1}{2}$ -1 in. diam. 38. *C. sessiliflora*.
 Leaves $\frac{1}{3}$ - $\frac{1}{2}$ in. $\times \frac{1}{30}$ in., narrow-linear-subulate. Head $\frac{1}{4}$ - $\frac{1}{2}$ in. 39. *C. argentea*.

*** Leaves entire or serrate, perfectly glabrous on both surfaces, or with minute glandular pubescence only.

- Leaves $\frac{1}{4}$ - $\frac{3}{8}$ in. $\times \frac{1}{8}$ - $\frac{1}{6}$ in., linear-spathulate, obtuse, green and glabrous, narrowed into short cottony petioles .. 40. *C. bellidioides*.
 Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in. $\times \frac{1}{4}$ - $\frac{1}{2}$ in., oblong-spathulate, acute, serrate, glandular-pubescent 41. *C. glandulosa*.

-C. Herbaceous. Leaves rosulate. Disc-florets purple.

- Leaves 1-4 in. \times $\frac{1}{8}$ - $\frac{1}{3}$ in., linear, coriaceous, shining,
 glabrous 42. *C. vernicosa*.
 Leaves 3-5 in. \times $\frac{1}{2}$ - $\frac{3}{4}$ in., lanceolate, grooved and sparingly
 tomentose beneath 43. *C. Campbellensis*.

1. **C. Walkeri**, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 549, t. 30.—Stem stout, woody, much or sparingly branched, procumbent or suberect, 1-4 ft. long; branches spreading, densely leafy. Leaves very numerous, crowded, with broad imbricating sheathing bases wider than the blade, 1-1 $\frac{1}{2}$ in. long; blade spreading, linear, acute, subcoriaceous, glabrous and somewhat viscid above, clothed with soft white tomentum beneath; margins flat, serrulate. Peduncles 1-3 near the tips of the branches, 4-8 in. long, slender, glandular-pubescent; bracts numerous, linear-subulate. Heads 1-1 $\frac{1}{2}$ in. diam.; involucre bracts linear-subulate, pubescent and glandular, tips recurved. Ray-florets 30-40; ligule narrow, spreading. Achenes linear, silky, with 2-3 obscure ribs on each face.—*Students' Fl.* 280.

SOUTH ISLAND: Canterbury—Mountains above Arthur's Pass, *T. F. C.* Westland—Kelly's Hill, *Petrie!* Otago—Mountains near Lake Harris, *Kirk!* Mount Alta, *Buchanan!* Mount Aspiring, *Petrie!* near Mount Earnslaw, *H. J. Matthews!* 3000-5000 ft. December-February.

A very remarkable plant, easily recognised by the stout branching stem, densely clothed with imbricating leaves. Its only near ally is the following species.

2. **C. rupestris**, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 409.—Stems long, much-branched, stout and woody, prostrate, scrambling over rocks; branches ascending at the tips, densely clothed with closely imbricating leaves. Leaves numerous, crowded, $\frac{1}{2}$ -1 in. long, narrow linear-spathulate, obtuse, gradually narrowed to the base and then expanded into a broad membranous sheath, silky above, beneath clothed with soft white tomentum, suberect when young, patent or deflexed when old; margins strongly revolute. Peduncles 1 or 2 near the tips of the branches, 3-6 in. long, glandular-pubescent. Heads about 1 in. diam.; involucre bracts numerous, narrow-linear, pubescent and glandular. Ray-florets numerous, narrow, spreading. Achenes not seen.—*Kirk, Students' Fl.* 281.

SOUTH ISLAND: Nelson—Ravines on Mount Peel, alt. 4000-5000 ft., *T. F. C.*

Nearest to *C. Walkeri*, but distinguished by the smaller size, smaller narrower and more silky leaves with revolute margins, and by the smaller heads.

3. **C. Gibbsii**, *Cheesem. n. sp.*—Stems slender, woody, sparingly branched, creeping and rooting at the base, erect or ascending above; branches few, short, leafy. Leaves numerous, laxly imbricating, spreading or reflexed from an appressed sheathing base,

$\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, linear-lanceolate, tapering from the base to a rather obtuse or subacute tip, coriaceous, somewhat rigid, green or glabrous above, beneath and on the sheaths sparsely covered with minute white lepidote scales; margins thick, revolute; midrib impressed above, much thickened and flattened beneath. Peduncles near the ends of the branches, solitary or more rarely 2 or 3, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, slender, sparsely glandular-lepidote; bracts 8–10, small, erect, linear-oblong, obtuse. Heads $\frac{3}{4}$ in. diam.; involucre bracts linear-oblong, acute, more or less clothed with white glandular scales, inner with a tuft of cottony hairs at the tip. Ray-florets numerous, spreading. Achenes grooved, hispid.

SOUTH ISLAND: Nelson—Mount Cobb (to the north of the Mount Arthur Plateau), *F. G. Gibbs*!

An interesting novelty, quite distinct from the other species of the section, and remarkable for the lepidote pubescence on the under-surface of the leaves, &c.

4. *C. ramulosa*, *Hook. f. Handb. N.Z. Fl.* 733.—Stems woody, procumbent, branched, 2–8 in. long; branches short, ascending or almost erect. Leaves numerous, densely imbricating, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-oblong, obtuse, coriaceous, with broad membranous sheathing bases, glabrous above, clothed with soft white tomentum beneath; margins strongly revolute. Peduncles 1 or rarely 2 at the tips of the branches, short, slender, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, glandular-tomentose; bracts 1–3, small, narrow-linear. Heads $\frac{3}{4}$ –1 in. diam.; involucre bracts linear-oblong, acute, glandular-pubescent. Rays spreading, narrow. Ripe achenes not seen.—*Kirk, Students' Fl.* 281.

SOUTH ISLAND: Otago—Mount Pisa, *Petrie*! Mount Cardrona, *Goyen*; Mount Bonpland, *H. J. Matthews*! mountains above Dusky Sound, *Hector* and *Buchanan*! *Reischek*! mountains near Lake Hauroto, *G. M. Thomson*! 3000–6000 ft. January.

A very distinct little plant, much smaller than the preceding, and with smaller appressed leaves which are white and cottony beneath, and show no signs of the peculiar lepidote scales of *C. Gibbsii*.

5. *C. lateralis*, *Buch. in Trans. N.Z. Inst.* iv. (1872) 226, t. 15.—Stems 3–12 in. long or more, slender, procumbent, woody at the base, much and closely branched, often forming compact patches; branches crowded, ascending or suberect. Leaves very numerous, densely crowded, spreading at the base but usually incurved at the tips, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-subulate, acute or apiculate, flat above but slightly convex beneath, green on both surfaces, glabrous or glandular-ciliate at the margins and apex, base with a short and broad membranous slightly cottony sheath. Peduncles slender, 2–3 in. long, often numerous, terminal and lateral, glandular-pubescent or cottony; bracts linear-subulate. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.;

involucral bracts subulate-lanceolate, acute, glandular and silky, margins often scarious. Rays numerous, narrow, $\frac{1}{3}$ in. long. Achene linear, silky.—*Kirk, Students' Fl.* 281.

Var. *villosa*, *Cheesem.*—Leaves densely clothed on both surfaces with soft spreading glandular hairs.

SOUTH ISLAND: Nelson—Mount Arthur, *Rev. F. H. Spencer! T. F. C.*; mountains near Lake Guyon, *H. H. Travers*; Mount Rochfort, *Townson!* Westland—Mountains near Greymouth, *Helms!* Var. *villosa*: Mount Murchison, Buller Valley, *Townson!* 3000–4500 ft. December–January.

A very singular species, quite unlike any other.

6. *C. holosericea*, *Hook. f. Fl. Antarct.* i. 36.—Leaves all radical, spreading, 6–12 in. long, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. broad, lanceolate, oblong-lanceolate or spathulate-lanceolate, acute or acuminate, narrowed to the base, thinly coriaceous, glabrous above, clothed with thin appressed white tomentum beneath, midrib and principal veins distinct on both surfaces; margins flat, distantly acutely serrate; petiole broadly sheathing, glabrous, smooth and shining, grooved. Scapes few, 1–2 ft. long, slender, glabrous; bracts usually several, 1 – $1\frac{1}{2}$ in. long, linear, white beneath. Heads large, 2–3 in. diam. or more; involucral bracts in several series, sometimes 1 in. long; inner narrow-linear, glabrous, usually viscid; outer broader, lanceolate, tomentose on the back. Ray-florets very numerous, with long narrow ligules. Achene pilose.—*Fl. Nov. Zel.* i. 121, t. 31; *Handb. N.Z. Fl.* 130; *Kirk, Students' Fl.* 282. *Aster holosericeus*, *Forst. Prodr.* n. 296; *A. Rich. Fl. Nov. Zel.* 248; *A. Cunn. Prodr.* n. 438.

SOUTH ISLAND: Dusky Bay, *Forster, Hector and Buchanan!* Jackson's Bay, *Buchanan!* Port Preservation, *Lyall*; Clinton Saddle and mountains west of Lake Te Anau, *Petrie!* Sea-level to 4000 ft. December–January.

7. *C. Dallii*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 355, t. 35.—Leaves numerous, all radical, spreading, 4–8 in. long, 1–2 in. broad, narrow obovate-oblong or obovate-lanceolate, obtuse or subacute or apiculate, narrowed to the base and then expanded into a broad grooved membranous sheathing petiole, coriaceous, glabrous above, clothed with appressed pale-buff tomentum beneath; margins flat, sharply minutely serrate. Scapes 1–6, 6–18 in. long; rather stout, glabrous; bracts usually numerous, large, 1–2 in. long, leafy, clothed with buff tomentum beneath, usually several are aggregated under the head, forming a spurious involucre. Heads large, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. diam.; involucral bracts in several series, narrow-linear; inner cottony, outer slightly tomentose, viscid. Rays numerous, rather narrow. Achene pilose.—*Kirk, Students' Fl.* 282.

SOUTH ISLAND: Nelson—Mountains at the head of the Aorere River, *Dall!* Mount Arthur Plateau, *Rev. F. H. Spencer! T. F. C.*; Mount Rochfort, *Spencer! Townson!* 3000–5000 ft. December–January.

A handsome plant, closely allied to *C. holosericea*, but distinguished by the smaller size, more coriaceous leaves with buff, not white, tomentum, and especially by the large leafy bracts.

8. *C. hieracifolia*, Hook. f. *Fl. Nov. Zel.* i. 124, t. 34B.—Stems short. Leaves 1–5 in. long, $\frac{1}{2}$ –1 in. broad, obovate-oblong to linear-oblong, obtuse or acute, narrowed to the base, coriaceous, obtusely crenate or serrate, glabrous or slightly pubescent above, viscid, clothed with appressed buff tomentum beneath; sheathing petiole strongly grooved, short, broad, glabrous. Scapes 2–10 in. long, stout, viscid, usually densely glandular-pubescent; bracts 3–10, linear, pubescent. Heads $\frac{3}{4}$ –1 $\frac{1}{2}$ in. diam.; involucral bracts linear, acuminate, viscid and glandular-pubescent; inner often cottony, outer recurved at the tips. Rays rather long, numerous. Achene silky, ribbed, longer than the pappus.—*Handb. N.Z. Fl.* 131; *Kirk, Students' Fl.* 283.

Var. *oblonga*, Kirk, l.c.—Much smaller than the type. Leaves 1–2 $\frac{1}{2}$ in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, linear-oblong. Scapes 1–3 in. high. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.

SOUTH ISLAND: Nelson—Dun Mountain Range, *Bidwill, Monro, Sinclair, T. F. C.* Var. *oblonga*: Mount Arthur and Mount Owen, *T. F. C.*; Mount Stokes, *Kirk! MacMahon!* 3500–4500 ft. December–January.

Apparently rare and local. The buff tomentum separates it from all the allied species except *C. Dallii*, which differs in its much greater size and broad leafy bracts.

9. *C. prorepens*, Petrie in *Trans. N.Z. Inst.* xix. (1887) 326.—Stems prostrate, much-branched, often forming large patches, densely clothed with the remains of the old leaf-sheaths. Leaves numerous, crowded, green on both surfaces, 1 $\frac{1}{2}$ –3 in. long, $\frac{1}{2}$ –1 in. broad, linear-oblong to linear-obovate, acute or subacute, hardly coriaceous, longitudinally furrowed and wrinkled, viscid, glabrous on both surfaces or slightly cottony beneath, coarsely serrate, margins slightly recurved; sheathing petiole short, narrower than the blade, viscid. Scapes few, 3–8 in. long, slender, viscid, glabrous or nearly so; bracts several, linear or lanceolate. Heads 1–2 in. diam.; involucral bracts subulate-lanceolate, viscid; inner slightly cottony, with scarious margins; outer shorter and broader, puberulous. Rays long, spreading. Achene silky.—*Kirk, Students' Fl.* 283.

SOUTH ISLAND: Otago—Upper Waipori, Rock and Pillar Range, Old Man Range, *Petrie!* 2000–4500 ft. December–January.

A well-marked plant, at once recognised by the deeply wrinkled almost glabrous leaves, green on both surfaces.

10. *C. densiflora*, Hook. f. *Handb. N.Z. Fl.* 130. — Leaves 3–7 in. long, $\frac{3}{4}$ –1 $\frac{1}{2}$ in. broad, narrow linear-oblong, obtuse or subacute, subcoriaceous, glabrous above, clothed with soft white tomentum beneath except the prominent midrib; margins flat, crenate-dentate; sheathing petiole 1 $\frac{1}{2}$ –3 $\frac{1}{2}$ in. long, membranous, glabrous or the margins slightly cottony. Scapes usually several, 6–18 in. long, stout or slender, glabrous, viscid; bracts few or

many, linear, 1-2 in. long. Heads 1-2 in. diam.; involucre bracts very numerous, in many series, linear-subulate, glabrous or pubescent, viscid; tips recurved. Rays long and narrow, twisted when withering. Achene narrow-linear, equalling the pappus, silky, strongly ribbed.—*Kirk, Students' Fl.* 282.

SOUTH ISLAND: Canterbury — Mountains at the head of Lake Ohau, *Haast*! Otago — Lake district, *Hector* and *Buchanan*! Kurow and Mount Ida Ranges, Mount St. Bathans, *Mihiwaka*, *Petrie*! 800-3000 ft. December-February.

Best recognised by the obtuse linear-oblong crenate-dentate leaves and numerous involucre bracts and florets. It has been recorded from the Tararua Range, in the North Island, but I have seen no specimens from thence.

11. *C. discolor*, *Hook. f. Fl. Nov. Zel.* i. 123.—Stems branched below; branches short or long, prostrate or suberect, usually densely clothed with the old persistent leaves. Leaves crowded, imbricating, very variable in size and shape, 1-2½ in. long, ¼-½ in. wide, oblong-spathulate to linear, obtuse or acute, entire or serrulate, very coriaceous to almost membranous, viscid, glabrous or hoary above, clothed with appressed white tomentum beneath, broad or narrow at the base, sometimes almost petiolate; sheaths ⅓-½ as long as the blade, glabrous. Scapes 1 or several, 2-8 in. long, very slender, viscid and glandular-pubescent; bracts usually several, linear-subulate. Heads ¾-1½ in. diam.; involucre bracts linear-subulate, viscid, usually glandular-pubescent, outer with recurved tips. Rays narrow, spreading. Achene silky.—*Handb. N.Z. Fl.* 131; *Kirk, Students' Fl.* 283. *Erigeron novæ-zealandiæ*, *Buch. in Trans. N.Z. Inst.* xvii. (1885) 287, t. 15.

SOUTH ISLAND: Abundant in mountain districts throughout. Altitudinal range 2500 ft. to 5000 ft. December-February.

One of the most variable species of the genus. Large much-branched states approach *C. Walkeri*; short and broad-leaved forms come very near to *C. incana*; and states with large membranous leaves appear to pass directly into *C. Sinclairii*.

12. *C. incana*, *Hook. f. Fl. Nov. Zel.* i. 123, t. 34A.—Rhizome prostrate; branches short, stout, densely clothed with the old persistent leaves. Leaves numerous, crowded, 1-2½ in. long, ½-¾ in. broad, oblong-spathulate or obovate-spathulate, obtuse or subacute, coriaceous, entire or minutely serrulate, plaited or furrowed above, both surfaces or the lower alone thickly coated with lax show-white soft tomentum; sheaths ½ as long as the blade, thin and membranous, grooved, glabrous or slightly cottony. Scapes 1-3, stout, 3-9 in. high, tomentose; bracts many, linear. Heads ¾-1½ in. diam.; involucre bracts subulate-lanceolate, acute or acuminate, glandular-pubescent and viscid; the outer often recurved. Rays numerous, spreading. Achene linear, silky, about equalling the pappus.—*Handb. N.Z. Fl.* 131; *Kirk, Students' Fl.* 284. *C. robusta*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 215, t. 18.

Var. *petiolata*, Kirk, l.c.—Smaller in all its parts. Leaves with an oblong blade suddenly narrowed into a distinct petiole at the top of the expanded sheath, often quite glabrous above, the tomentum of the under-surface more silvery and appressed. Heads smaller, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.

NORTH ISLAND: Summit of Moehau (Cape Colville), Adams! Mount Hikurangi, Colenso, Adams and Petrie! Ruahine Mountains, Colenso! Tararua Mountains, Buchanan. SOUTH ISLAND: Not uncommon on the mountains as far south as Canterbury and the west of Otago. 2500–5000 ft. December–January.

The typical state, with large broad plaited leaves clothed on both surfaces with snow-white tomentum, has a very distinct appearance; but small forms, with smaller and narrower leaves almost glabrous above, are difficult to separate from *C. discolor*.

13. *C. Haastii*, Hook. f. *Handb. N.Z. Fl.* 131.—Forming large patches. Rhizome creeping, putting up short erect branches. Leaves greenish-grey, $1\frac{1}{2}$ –3 in. long, $\frac{1}{2}$ –1 in. wide, broadly oblong to oblong-spathulate or narrow obovate-spathulate, obtuse or acute, narrowed towards the base, subcoriaceous, glabrous and usually longitudinally plaited above, beneath clothed with thin whitish tomentum; margins recurved, minutely denticulate; sheaths $\frac{1}{3}$ – $\frac{1}{2}$ as long as the blade, thin, membranous, glabrous. Scapes usually several, 2–6 in. long, stout, densely tomentose or almost glabrous; bracts many, linear, acute or rarely obtuse, tomentose. Heads 1– $1\frac{1}{2}$ in. diam.; involucre bracts linear, acute or acuminate, membranous, softly tomentose or almost villous. Rays spreading. Achene linear, glabrous, longer than the pappus.—Kirk, *Students' Fl.* 284.

SOUTH ISLAND: Not uncommon in the central and western portions of the Southern Alps, from the Spencer Mountains southwards. 3000–6000 ft. December–February.

Well marked by the greenish-grey foliage, stout usually tomentose scapes with numerous linear bracts, membranous involucre bracts, and glabrous achene.

14. *C. Lindsayi*, Hook. f. *Handb. N.Z. Fl.* 132.—Often forming large rounded masses. Stems stout, woody, prostrate; branches numerous, decumbent or suberect. Leaves numerous, crowded, 3–8 in. long, $\frac{1}{2}$ –1 in. broad, linear-oblong or lanceolate, obtuse or subacute, coriaceous, obscurely and remotely denticulate or quite entire, glabrous above, clothed with appressed white tomentum beneath, midrib evident; sheaths broad, glabrous, deeply grooved. Scapes usually numerous, 2–8 in. long, slender, flexuous, glabrous or pubescent above; bracts linear. Heads 1–2 in. diam.; involucre bracts linear, acuminate, glabrate or pubescent. Ray-florets 30–40, spreading, rather distant. Tube of the disc-florets somewhat thickened; anther-cells obtuse at the base. Achene linear, silky.—Lindsay, *Contrib. N.Z. Bot.* 53, t. 3, f. 1; *Bot. Mag.* t. 7134; Kirk, *Students' Fl.* 284. *Erigeron Bonplandii*, Buch. in *Trans. N.Z. Inst.* xix. (1887) 213.

SOUTH ISLAND: Otago—Cliffs of the south-east coast, from the Clutha River to Waikawa, *Lindsay, Buchanan! Petrie! Kirk! Mount Bonpland, Martin; Lake Harris, H. J. Matthews.* January–February.

A handsome species, which succeeds well in cultivation. Mr. Kirk considers that the Mount Bonpland and Lake Harris localities are erroneous.

15. **C. Sinclairii**, *Hook. f. Handb. N.Z. Fl.* 132. — Stems branched at the base, prostrate; branches suberect. Leaves 1–3 in. long or more, $\frac{1}{4}$ – $\frac{3}{4}$ in. broad, linear-obovate or obovate-spathulate to linear-oblong, obtuse or subacute, membranous or rarely coriaceous, obscurely toothed, glabrous above, beneath clothed with thin white appressed tomentum or rarely glabrous on both surfaces; midrib evident; sheaths membranous, glabrous or slightly cottony. Scapes 1 or more, slender, 3–9 in. high; bracts linear, white beneath. Heads 1–1½ in. diam.; involucre bracts linear-subulate, pubescent and viscid; tips recurved. Ray-florets spreading. Achene silky.—*Kirk, Students' Fl.* 285.

SOUTH ISLAND: Not uncommon throughout in mountain districts. STEWART ISLAND: Summit of Mount Anglem, *Kirk!* Altitudinal range 2500–5000 ft. December–January.

This comes very close to large forms of *C. discolor*, being only separable by the larger and much more membranous leaves, which are dull-green above and clothed with thin tomentum beneath.

16. **C. Traversii**, *Hook. f. Handb. N.Z. Fl.* 134. — Root stout, tapering. Leaves 6–16 in. long including the petiole, 1½–2½ in. broad, oblong or oblong-lanceolate, subacute or obtuse, coriaceous, dark brownish-green and glabrous above except the silky midrib, under-surface and margins clothed with rich soft and thick velvety ferruginous tomentum; midrib beneath glabrous, dark-purple; petiole from one-half to as long as the blade, purple; upper surface and sheaths with loose snow-white tomentum. Scapes stout, 8–20 in. long, densely clothed with ferruginous tomentum; bracts few or many, linear. Heads 1–2 in. diam.; bracts of the involucre numerous, linear, clothed with ferruginous wool. Rays narrow, spreading. Achene glabrous.—*Kirk, Students' Fl.* 285.

SOUTH ISLAND: Nelson—Mount Arthur, Mount Peel, Raglan Mountains, *T. F. C.*; Discovery Peaks, *Travers!* mountains overlooking the Hammer Plains and Upper Clarence Valley, *T. F. C.*; Mount Captain and the Upper Waiau, *Kirk!* 3500–5500 ft. December–January.

A magnificent species, remarkable for the bright ferruginous tomentum of the under-surface of the leaves, the purple midrib, and the snow-white tomentum of the sheaths. I have not seen specimens from the south of Lake Tennyson.

17. **C. cordatifolia**, *Buch. in Trans. N.Z. Inst.* xi. (1879) 427, t. 18. — Leaves 2–9 in. long including the petiole, ½–2 in. broad; blade about half the length, ovate-oblong or oblong, obtuse or sub-

acute, cordate at the base, coriaceous, entire, dull-green and glabrous above, plaited, beneath clothed with velvety ferruginous tomentum; petiole grooved, expanded into a broad sheath at the base, villous with brownish tomentum or almost glabrous, sometimes purplish. Scape 6–12 in. long, stout, clothed with ferruginous tomentum; bracts numerous, linear. Heads $1\frac{1}{2}$ –2 in. diam.; involucre bracts numerous, villous or almost glabrous. Rays narrow, $\frac{3}{4}$ in. long. Achene linear, glabrous, strongly ribbed, exceeding the pappus.—*C. petiolata* var. *cordatifolia*, Kirk, *Students' Fl.* 286.

SOUTH ISLAND: Nelson—Mount Starveall, A. McKay! Bryant! Mount Duff, Mount Richmond, MacMahon! January.

In the "Students' Flora" Mr. Kirk has reduced this to *C. petiolata*, but it differs from all the forms of that species in the broader coriaceous leaves cordate at the base, and in the dark ferruginous tomentum. In the texture of the leaves and their tomentum it approaches *C. Traversii*, but differs entirely in the cordate leaf-base, and in the petioles wanting the snow-white tomentum which is so characteristic a feature of that plant.

18. *C. petiolata*, Hook. f. *Handb. N.Z. Fl.* 134. — Leaves 4–14 in. long including the petiole, $\frac{3}{4}$ –2 in. wide; blade about half the length, oblong to linear-oblong or oblong-lanceolate, subacute, membranous or coriaceous, entire, glabrous or silky above, beneath clothed with whitish appressed tomentum; midrib usually glabrous, purple, veins diverging; petiole purplish, grooved, more or less loosely tomentose, expanded at the base into a short sheath. Scapes usually several, 6–18 in. long, often purplish, tomentose or villous; bracts linear. Heads $1\frac{1}{2}$ –2 $\frac{1}{2}$ in. diam.; involucre bracts linear-subulate, usually densely tomentose. Ray-florets numerous, with a ligule $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Achene glabrous or nearly so, strongly ribbed.—Kirk, *Students' Fl.* 286.

Var. *rigida*, Kirk, l.c. — Leaves oblong-lanceolate or ovate-lanceolate, coriaceous, rigid, tomentum of under-surface white or ferruginous. Head rather larger, the rays sometimes 1 in. long.

Var. *membranacea*, Kirk, l.c. — Leaves narrowed at both ends, acute, membranous, glabrous on both surfaces or nearly so. Scape glabrate or pubescent. Heads rather smaller, involucre bracts glabrate.

SOUTH ISLAND: Not uncommon in the central and western portions of the Southern Alps, from Lake Tennyson southwards to the west of Otago. Var. *rigida*: Stewart Island, Kirk! Var. *membranacea*: Clarence and Waiau Valleys, Travers! Kirk! Lyell Mountains, Townson! 2000–4500 ft. December–January.

Best distinguished by the almost membranous narrow-oblong leaves, with purple midribs and long and slender purple petioles.

19. *C. Rutlandii*, T. Kirk in *Trans. N.Z. Inst.* xxvii. (1895) 329. — Leaves 3–12 in. long including the petiole, 1–2 $\frac{1}{2}$ in. broad, oblong or oblong-lanceolate, acute or apiculate, narrowed into the petiole, coriaceous, glabrous above or the midrib slightly cottony,

beneath clothed with appressed white satiny tomentum; margins entire or minutely denticulate, often revolute; petiole shorter than the blade or equalling it, broad, grooved, densely clothed with loose snow-white tomentum. Scapes several, exceeding the leaves, softly cottony; bracts narrow-linear, purplish, tomentose. Heads 1–1 $\frac{3}{4}$ in. diam.; involucrel bracts linear, acuminate, erect, glabrate or the outer cottony. Ray-florets numerous. Achenes silky, strongly grooved.—*Students' Fl.* 286.

SOUTH ISLAND: Marlborough—Mount Stokes, *Kirk!* *MacMahon!* December–January.

A handsome and distinct species, allied to *C. petiolata*, but differing in the loose snow-white tomentum of the sheaths, the satiny under-surface of the leaves, and the thin erect almost glabrous involucrel bracts.

20. *C. spectabilis*, *Hook. f. Fl. Antarct.* i. 35.—Often forming large patches. Stems stout, with the leaf-sheaths 1–2 in. diam. Leaves very numerous, crowded, rosulate; blade 3–6 in. long, $\frac{1}{4}$ – $\frac{3}{4}$ in. broad, narrow linear-oblong, acute or obtuse, slightly narrowed towards the base, very thick and coriaceous, glabrous or with a thin pellicle of silvery hairs above, longitudinally furrowed, beneath clothed with densely matted pale-buff or white woolly tomentum; margins recurved, entire or minutely serrulate; sheaths usually equalling the blade, membranous, clothed on both surfaces with loose soft and silky snow-white tomentum. Scapes 1 or several, stout, much longer than the leaves, densely cottony; bracts numerous, linear. Heads about 1 $\frac{1}{2}$ in. diam.; involucrel bracts narrow linear-subulate, woolly or rarely almost glabrate, outer recurved at the tips. Rays numerous, rather short. Achene glabrous.—*Fl. Nov. Zel.* i. 122, t. 33; *Handb. N.Z. Fl.* 134; *Kirk, Students' Fl.* 287. *C. ruahinensis*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 388. *C. mollis*, *Cockayne, l.c.* xxxi. (1899) 423.

NORTH ISLAND: Mountains of the interior, from Mount Hikurangi and Lake Taupo southwards. SOUTH ISLAND: Abundant in mountain districts in Nelson, Canterbury, and Westland; rare in Otago. 500–4500 ft. *Puhaere-taiko.* December–February.

Well marked by the short narrow rigid leaves, densely clothed beneath with pale-buff soft and matted not appressed woolly tomentum. Mr. Cockayne's *C. mollis* is a state with the tomentum not nearly so woolly, the hairs being straighter and more silky.

21. *C. dubia*, *Cheesem. n. sp.*—Forming large patches. Stems rather stout, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. with the leaves on. Leaves 1 $\frac{1}{2}$ –3 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad; blade oblong or linear-oblong or lanceolate, acute at both ends, coriaceous, glabrous and furrowed above, clothed with soft white tomentum beneath, midrib distinct beneath; margins usually recurved, entire or very obscurely serrulate; petiole equalling the blade or shorter than it, slender, expanded below into a broad membranous sheath. Scapes 1 or more, 3–8 in. long, rather slender, white with loose cottony

tomentum; bracts 4-6, linear or linear-spathulate. Heads about $\frac{3}{4}$ in. diam.; involucral bracts numerous, linear or linear-lanceolate, acute, scarious, shining, sparingly cottony or almost glabrate. Rays numerous, spreading. Achene glabrous.

SOUTH ISLAND: Nelson—Mount Rochfort, Mount Frederic, and other localities near Westport, Townson! 2000-3000 ft. January-March.

A puzzling plant, which seems nearer to *C. spectabilis* than to any other species, although very different in appearance. In some respects it approaches *C. parva*, which, however, is a much smaller and more slender plant, with an almost filiform and nearly glabrous scape, and with much smaller heads and hispid achenes.

22. *C. verbascifolia*, Hook. f. *Fl. Nov. Zel.* i. 121.—A large handsome species. Root stout, as thick as the thumb. Leaves 8-20 in. long or more including the petiole, $1\frac{1}{2}$ -3 in. broad, lanceolate to oblong-lanceolate or spathulate-lanceolate, acute, narrowed into the petiole, coriaceous, glabrous or slightly cottony above but with woolly margins, beneath clothed with soft white or buff tomentum, entire or very obscurely serrulate; petiole as long as the blade, narrow, broader and sheathing at the base, grooved, densely woolly or almost glabrous. Scapes longer than the leaves, densely woolly; bracts numerous, linear or linear-spathulate, tomentose, the lowest sometimes 4 in. long. Heads about 4 in. diam.; involucral bracts narrow-linear, densely and softly woolly. Ray-florets slender; tube of corolla of disc-florets thickened below. Achene linear, glabrous, hardly equalling the pappus.—*Handb. N.Z. Fl.* 132; *Kirk, Students' Fl.* 285.

SOUTH ISLAND: Otago—Milford Sound and Port Preservation, Lyall (Handbook); Waitaki Valley, Horse Rauges, Flag Swamp, Macrae's, Petrie! *Kirk!* Sea-level to 2000 ft. December-February.

I have seen no specimens from the localities where the species was originally discovered by Lyall, and it is quite possible that the plant from the Waitaki Valley, &c., on which the above description is founded, may not be the same. It has been reported from Campbell Island, but I think erroneously.

23. *C. Brownii*, F. R. Chapm. in *Trans. N.Z. Inst.* xxii. (1890) 444.—Leaves 6-10 in. long including the petiole, 1-2 in. broad, lanceolate or oblong-lanceolate, acute, gradually narrowed into the petiole, coriaceous, quite entire or very obscurely denticulate, glabrous or sparingly pubescent above, beneath clothed with rather thin white or greyish-white tomentum; petiole shorter than the blade, tomentose. Scapes 6-14 in. long or more, tomentose; bracts linear, obtuse, almost villous. Heads 1-2 in. diam.; involucral bracts linear-subulate, villous towards the tips. Rays numerous, narrow, spreading. Achene sparingly silky.—*Kirk, Students' Fl.* 286.

SOUTH ISLAND: Otago—Mystery Pass, between Lake Manapouri and Smith Sound, Chapman; Clinton Valley, Lake Te Anau, Petrie!

Of this I have only seen a single leaf from Mr. Chapman's type, and a specimen of what appears to be the same collected by Mr. Petrie in the Clinton Valley. Further material is required to prepare a satisfactory description. It appears to differ from *C. verbascifolia* in the smaller size, thinner and more appressed tomentum, and much less woolly scapes, bracts, and involucre. A plant gathered by Mr. Cockayne on the Humboldt Mountains seems to be intermediate between the two species.

24. **C. Mackau**, *Raoul, Choix Pl. Nouv. Zel.* 19, t. 14.—Leaves 6–20 in. long, 2–4 in. broad, linear-lanceolate, acuminate, gradually narrowed to the base, quite entire, membranous, glabrous on both surfaces when mature or slightly cottony at the base, often rather glaucous beneath; petiole broad, grooved, sheathing at the base, usually cottony on the inner surface. Scapes 12–24 in. high, stout, glabrous or sparingly cottony; bracts numerous, lanceolate, acuminate, sheathing at the base. Heads about 2 in. diam.; involucre bracts numerous, ovate-lanceolate, acuminate, membranous, glabrous. Rays long and narrow. Disc-florets very numerous; corolla thickened at the base. Achene linear, glabrous, strongly ribbed.—*Hook. f. Fl. Nov. Zel.* i. 122; *Handb. N.Z. Fl.* 133; *Kirk, Students' Fl.* 287. *C. coriacea*, *Raoul, Ann. Sci. Nat.* 1844, 119 (*non Hook. f.*).

SOUTH ISLAND: Marlborough—Mount Fyffe, *H. B. Kirk* (leaves only). Canterbury—Rocky places near Akaroa, *Raoul*; Mount Herbert, *W. Gray*! January–February.

A very distinct species, remarkable for the long acuminate leaves green and glabrous on both surfaces, the large heads, and herbaceous acuminate involucre bracts.

25. **C. coriacea**, *Hook. f. Fl. Antarct.* i. 36.—Leaves 8–24 in. long or more, $\frac{3}{4}$ –3 in. broad, lanceolate or linear-lanceolate or linear-oblong, acute, narrowed towards the base, coriaceous, upper surface longitudinally furrowed or almost plicate and covered with a delicate silvery pellicle, beneath clothed with appressed white and silvery tomentum; margins entire or very obscurely serrulate; sheaths short, broad, grooved, densely clothed with soft cottony or woolly tomentum. Scapes stout, 1–3 ft. high, densely woolly or cottony; bracts numerous, linear, erect, cottony. Head $1\frac{1}{2}$ –3 in. diam. or more; involucre bracts numerous, linear-subulate, cottony or almost glabrate. Rays very numerous, spreading, $1\frac{1}{2}$ in. long; tube of corolla more or less pubescent. Achene linear, compressed, grooved, pubescent.—*Fl. Nov. Zel.* i. 121, t. 32; *Handb. N.Z. Fl.* 132; *Kirk, Students' Fl.* 287. *C. Martini*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 213. *C. flaccida*, *Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 422. *Aster coriaceus*, *Forst. Prodr.* n. 297; *A. Rich. Fl. Nouv. Zel.* 250; *A. Cunn. Precur.* n. 439.

NORTH ISLAND: Tararua Mountains, *Buchanan*. SOUTH ISLAND: Abundant in mountain districts. Altitudinal range 1500–4500 ft. *Cotton-plant*; *Leather-plant*. December–February.

A truly noble plant, probably the finest species of the genus. In its most luxuriant state it has a short stout stem which with the old leaf-sheaths is sometimes as thick as the wrist, and is crowned with numerous spreading and erect lanceolate leaves, from among which arise one or several stout scapes, bearing heads sometimes more than 3 in. diam., with long and narrow rays. This passes by almost imperceptible gradations into smaller varieties with narrower often less coriaceous leaves and smaller heads, with shorter and proportionately broader rays. It is difficult to find distinguishing characters between some of these forms and *C. Monroii* and other species. In cultivation it varies still more largely, and often produces branched scapes, a peculiarity quite unknown in any *Celmisia* in the wild state, so far as my own observations go. Some of the cultivated races appear to be permanent, and Mr. Kirk has briefly characterized the following in his "Students' Flora": (1) *foliosa*, with crowded foliaceous bracts sometimes 6 in. long; (2) *corymbifera*, with branched scapes, the heads forming an open corymb; and (3) *ensata*, which has ensiform leaves 8-12 in. long and $\frac{1}{2}$ in. wide, and an irregularly branched scape. Mr. H. J. Matthews informs me that the last form, which has a very distinct appearance, occurs in a wild condition near Lake Harris, Otago, but I have only seen cultivated specimens.

26. **C. Armstrongii**, *Petrie in Trans. N.Z. Inst.* xxvi. (1894)
269.—Stems short, stout, with the leaf-sheaths sometimes as thick as the wrist, crowned with numerous radiating leaves. Leaves 6-18 in. long or more, $\frac{1}{4}$ - $\frac{3}{4}$ in. broad, linear-ensiform, gradually tapering from below the middle to the acute apex, slightly narrowed below, rigidly coriaceous, upper surface longitudinally ribbed and covered with a delicate silvery pellicle, beneath clothed with smooth and satiny appressed tomentum, except the very stout and prominent midrib; margins recurved when dry; sheaths long, broader than the blade, clothed with snow-white cottony tomentum. Scapes usually several, as long as or longer than the leaves, rather slender, white and cottony; bracts numerous, linear. Head 1-1 $\frac{1}{2}$ in. diam.; involucre bracts linear-subulate, rather rigid, glabrous or cottony on the margins, tips recurved. Rays narrow. Achene linear, grooved, pubescent.—*Kirk, Students' Fl.* 290.

SOUTH ISLAND: Nelson—Heaphy River, *Dall!* mountains near Westport, *Townson!* Westland—Arthur's Pass, *Armstrong! Kirk! Cockayne! T. F. C.;* Kelly's Hill, *Petrie!* 2500-4500 ft. December-January.

Distinguished from *C. Lyallii* by the broader perfectly straight leaves with a stout midrib and satiny appressed tomentum. From *C. Monroii* it is separated by the more rigid ribbed and pointed leaves and almost glabrous heads.

27. **C. Petriei**, *Cheesem. n. sp.*—Apparently a stout tufted plant. Leaves 8-18 in. long or more, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, dagger-shaped, narrowed into an acuminate rigid and almost pungent point, contracted just above the top of the sheath, strict, erect, rigidly coriaceous, above perfectly glabrous and when dry marked with a stout longitudinal ridge or plait on each side of the middle of the leaf, beneath clothed with silvery-white appressed satiny tomentum and with two grooves answering to the ridges of the upper surface; midrib not evident on either surface; margins conspicuously recurved towards the tip of the leaf, less so or almost

flat elsewhere; sheaths $1\frac{1}{2}$ –3 in. long, broader than the blade, deeply grooved, more or less covered with thin cottony tomentum. Scape 12–18 in. long, stout, densely cottony; bracts numerous, narrow-linear, the lower often 2–3 in. long. Head $1\frac{1}{2}$ in. diam. or more; involucral bracts subulate-lanceolate, acuminate, chaffy and rather rigid, glabrate or the outer somewhat cottony, often recurved. Achene hispid.

SOUTH ISLAND: Otago—Clinton Saddle, Lake Te Anau, *Petrie*! Humboldt Mountains, *H. J. Matthews*!

A remarkable plant, of which I have seen only very imperfect specimens. The straight dagger-shaped leaves, with their two longitudinal plaits and rigid acuminate points, are quite unlike those of any other species.

28. **C. Lyallii**, *Hook. f. Handb. N.Z. Fl.* 133.—Stem short, stout, crowned with a dense tuft of crowded radiating leaves. Leaves 9–18 in. long or more, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, narrow-ensiform, straight or slightly curved, gradually tapering from the base to the rigid almost pungent tip, rigidly coriaceous, glabrous and smooth and even above, beneath strongly grooved and clothed with thin appressed tomentum or almost glabrous; margins quite entire; sheaths broader than the blade, thin, grooved, clothed with snow-white tomentum. Scapes 1 or several, longer or shorter than the leaves, rather slender, white with cottony tomentum; bracts linear. Head 1–2 in. diam.; involucral bracts subulate-lanceolate, rigid, glabrate or the margins cottony, tips recurved. Rays rather short, narrow. Achene linear, hispidulous, longer than the pappus.—*Kirk, Students' Fl.* 290.

Var. **pseudo-Lyallii**.—Leaves not so rigid, grooved and plaited above, beneath clothed with thick soft tomentum, which usually conceals both veins and midrib. Heads more cottony. Achene nearly glabrous.

SOUTH ISLAND: Common in mountainous districts throughout. 1000–4500 ft. December–January.

One of the most distinct species of the genus, easily recognised by the narrow tapering rigid leaves, with almost pungent tips.

29. **C. viscosa**, *Hook. f. Handb. N.Z. Fl.* 133.—More or less viscid in all its parts. Stem branched; branches short, stout, with the old sheaths 1– $1\frac{1}{2}$ in. diam. Leaves numerous, crowded, erect, 3–5 in. long, $\frac{1}{4}$ in. broad, linear, obtuse or acute, viscid, very thick and coriaceous, rigid, longitudinally grooved on both surfaces, glabrous or hoary above, beneath white or grey with appressed tomentum; sheaths about 1 in. long, broader than the blade, glabrous, brown. Scapes usually several, much longer than the leaves, 6–12 in. long, stout, pubescent and viscid; bracts numerous, linear. Head $1\frac{1}{2}$ in. diam.; involucral bracts numerous, linear-subulate, densely woolly and tomentose, viscid. Rays short, spreading. Achene linear, silky.—*Kirk, Students' Fl.* 290.

SOUTH ISLAND : Not uncommon in alpine localities from the Wairau Valley southwards. 4000-6500 ft. January.

A very distinct plant, well marked by the short and narrow erect grooved and viscid leaves, with glabrous sheaths.

30. **C. Monroi**, *Hook. f. Handb. N.Z. Fl.* 133.—Leaves 3-12 in. long, $\frac{1}{3}$ - $\frac{3}{4}$ in. broad, narrow linear-oblong or linear-lanceolate, acute or subacute, strict, coriaceous, longitudinally grooved or plaited above and covered with a delicate pellicle of silvery hairs, beneath clothed with appressed white tomentum, often wrinkled in parallel lines when dry; margins recurved; sheaths short, densely clothed with snow-white tomentum. Scapes 1 or several, 8-16 in. long, stout, woolly and cottony; bracts numerous, linear. Head 1-2 in. diam.; involucral bracts numerous, linear-subulate, usually more or less woolly and cottony. Rays numerous, $\frac{1}{2}$ - $\frac{3}{4}$ in. long; tube of corolla glabrous. Achene hispidulous.—*Bot. Mag. t.* 7496; *Kirk, Students' Fl.* 288.

SOUTH ISLAND : Marlborough—Upton Downs, Awatere, *Monro!* Canterbury—Mount Cook district, *Haast, T. F. C.*; Hopkins River, *Haast.* 1500-4500 ft. December-January.

The above description is based upon one of Monro's original specimens from the Upton Downs, now in Mr. Petrie's herbarium, and on others which almost exactly match it collected by myself in the Mount Cook district. Most of the specimens referred to *C. Monroi* in New Zealand collections are nothing more than small forms of *O. coriacea*; but it may be distinguished from all such by the narrower and more rigid leaves, which are usually conspicuously furrowed on both surfaces, and by the smaller heads with shorter broader rays, and by the glabrous corolla-tube. The plant figured in the "Botanical Magazine" has broader softer leaves than Monro's specimen.

31. **C. Adamsii**, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 329.—Leaves 6-18 in. long including the sheaths, $\frac{1}{2}$ -1 in. broad, narrow linear-oblong or linear-lanceolate, acute or obtuse, narrowed into an evident petiole at the top of the sheath, membranous, glabrous above, beneath clothed with soft white tomentum except the evident midrib; margins minutely denticulate, flat or slightly recurved; sheaths thin and membranous, grooved, sparingly cottony or almost glabrous. Scapes equalling or exceeding the leaves, slender, sometimes flexuose, thinly clothed with cottony tomentum; bracts short, linear. Head 1-1 $\frac{1}{2}$ in. diam.; involucral bracts subulate-lanceolate, acute, glabrous or cottony. Rays few, spreading. Achene glabrous.—*Kirk, Students' Fl.* 288.

Var. **rugulosa**, *Cheesem.*—Shorter and stouter. Leaves more coriaceous, wrinkled above; sheaths more cottony. Scapes stouter, densely cottony.

NORTH ISLAND : Auckland—Castle Rock, Coromandel, *T. F. C.*; Table Mountain (Whakairi) and other hills between the Thames and Tairua, *Adams!* *T. F. C.* Var. *rugulosa* : Mount Manaia and hills to the north of Whangarei Harbour, *Kirk!* *T. F. C.* December-January.

Most nearly allied to *C. longifolia*, from which it is separated by the broader and flatter membranous leaves. Mr. Kirk placed my variety *rugulosa* under *C. Monroi*, from which it differs markedly in the much less rigid habit, spreading thinner leaves, shorter cauline bracts, nearly glabrous involucre, and fewer rays. It is much nearer to *C. Adamsii*.

32. ***C. longifolia***, *Cass. in Dict. Sci. Nat.* xxxvii. 259.—Very variable in size and degree of robustness. Leaves few or many, 1–18 in. long, $\frac{1}{2}$ – $\frac{1}{3}$ in. broad, narrow-linear or narrow linear-lanceolate, acute or acuminate, membranous or somewhat coriaceous but never rigid, upper surface glabrous or silvery, furrowed or wrinkled or nearly smooth, beneath clothed with white silvery tomentum; margins usually much revolute but sometimes almost flat; midrib distinct beneath; sheaths variable in length, broader than the blade, membranous, white and cottony or almost glabrous. Scapes equalling or exceeding the leaves, slender, cottony; bracts few or many, linear. Head $\frac{1}{2}$ – $1\frac{1}{2}$ in. diam.; involucre bracts linear-subulate, glabrous or cottony, often blackish at the tips. Rays few or many, narrow. Achene linear, glabrous or rarely silky.—*Hook. f. Handb. N.Z. Fl.* 134; *Benth. Fl. Austral.* iii. 489; *Kirk, Students' Fl.* 288. *C. gracilentia*, *Hook. f. Fl. Antarct.* i. 35; *Fl. Nov. Zel.* i. 122. *Aster Celmisia*, *F. Muell. Fragm.* v. 84.

Var. ***gracilentia***, *Kirk, Students' Fl.* 289.—Leaves slender, usually erect, narrow-linear, margins revolute to the midrib. Scape slender. Head about 1 in. diam.—*C. gracilentia*, *Hook. f. Fl. Antarct.* i. 35.

Var. ***major***.—Leaves broader, spreading or recurved, narrow linear-lanceolate, acuminate; margins more or less revolute. Scape stout. Head 1– $1\frac{1}{2}$ in. diam.—*C. gracilentia* var. b, *Hook. f. Fl. Nov. Zel.* i. 123. *C. longifolia* vars *major* and *asteliæfolia*, *Kirk, Students' Fl.* l.c.

Var. ***graminifolia***, *Kirk, l.c.*—Leaves very slender, linear-elongate, membranous, often flaccid, acute; margins flat or nearly so. Scape very slender, often nearly glabrous. Head $\frac{1}{2}$ –1 in. diam., glabrate or slightly cottony.—*C. graminifolia*, *Hook. f. Fl. Antarct.* i. 35. *C. setacea*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 88.

Var. ***alpina***, *Kirk, l.c.*—Small. Rootstock stout, branched. Leaves 1–2 in. long, $\frac{1}{20}$ in. broad; margins slightly revolute; sheaths nearly glabrous. Scape slender, strict, 1–3 in. long. Head $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., glabrous or nearly so.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the Bay of Islands and the Great Barrier Island southwards, but rare and local to the north of the Upper Thames and Waikato. Sea-level to nearly 6000 ft. November–January.

The most widely distributed and variable species of the genus, found in all soils and situations. It is the only species that extends beyond the colony, being not uncommon in the Australian Alps and in Tasmania. The varieties characterized above are merely prevalent forms, and are connected by numerous intermediates.

33. ***C. linearis***, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 337.—Stems branched at the base; branches short, stout. Leaves numerous, densely crowded, 1–5 in. long, $\frac{1}{6}$ – $\frac{1}{5}$ in. broad, narrow-linear, acute, not pungent, coriaceous, longitudinally grooved and covered with a pellicle of silvery hairs above, clothed with white

tomentum beneath; margins strongly recurved; sheaths from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the blade, rather broad, thin and membranous, cottony on the back. Scape stout, variable in length, 1–10 in. high, cottony or tomentose; bracts few or many, linear-subulate with a broad sheathing base. Head 1 in. diam.; involucre bracts lanceolate-subulate, outer tomentose or cottony, inner nearly glabrous. Rays short. Achene silky.—*Kirk, Students' Fl.* 289.

SOUTH ISLAND: Nelson—Summit of Mount Arthur, *T. F. C.* Canterbury—*Armstrong*; Mount Cook district, *T. F. C.* Otago—Maungatua, *Petrie*! STEWART ISLAND: Fraser Peaks, *Petrie* and *Thomson*! Mount Anglem, *Rakiahua*, Taylor's Lookout, *Kirk*! 1000–6000 ft. December–January.

Most of the Stewart Island specimens have longer and narrower leaves, with much more revolute margins, the tomentum is thinner and more appressed, and the scape is longer. Those from Mount Arthur have flatter leaves tapering from the base, the tomentum is buff-coloured and much looser, and the scape is shorter and densely woolly. It is possible that more species than one are included under the description, but the material is not sufficient to prove this.

34. *C. laricifolia*, *Hook. f. Fl. Nov. Zel.* ii. 331.—Stems prostrate or decumbent, much-branched at the base; branches 1–3 in. long, densely leafy. Leaves numerous, crowded, erect or recurved, $\frac{1}{3}$ –1 in. long, $\frac{1}{20}$ in. broad, very narrow-linear or acerose, pungent, glabrous or slightly silky above, clothed with silvery tomentum beneath; margins strongly recurved; sheaths much broader than the blade, membranous, cottony or almost glabrous. Scape 2–4 in. long, very slender, glabrate or cottony; bracts few, very small. Head $\frac{1}{2}$ in. diam.; involucre bracts few, erect, linear-subulate, cottony. Rays few, short. Achene hispid.—*Handb. N.Z. Fl.* 135; *Kirk, Students' Fl.* 289.

SOUTH ISLAND: Not uncommon in mountain districts throughout. 3000–6000 ft. December–January.

The small size and very narrow acerose leaves are excellent distinguishing characters.

35. *C. Hectori*, *Hook. f. Handb. N.Z. Fl.* 135.—Stems prostrate, branched, often woody at the base; branches densely tufted. Leaves numerous, crowded, imbricate, $\frac{1}{2}$ –1 in. long, $\frac{1}{6}$ – $\frac{1}{4}$ in. broad, linear-spathulate or linear-obovate, obtuse or subacute, gradually narrowed below, coriaceous, silky or clothed with a silvery pellicle above, covered with appressed silky tomentum beneath, margins recurved; sheaths slightly expanded, cottony or nearly glabrous. Scapes stout, 2–4 in. long, tomentose and villous; bracts usually numerous, linear. Heads $\frac{3}{4}$ –1 in. diam.; involucre bracts few, linear, acute, pubescent. Rays rather short, broad. Achene silky.—*Kirk, Students' Fl.* 291.

NORTH ISLAND: Tararua Range, *Budden*. South Island: Canterbury—Mount Brewster, *Haast*; Mount Cook district, *Dixon*! *T. F. C.* Otago—

Mount Alta, *Hector* and *Buchanan*! *Hector* Mountains, *Humboldt* Mountains, Mount Tyndall, the Remarkables; *Petrie*! Mount Earnslaw, *H. J. Matthews*. 4500-6500 ft. January-February.

Apparently a very distinct species, at once recognised by the small densely imbricated linear-obovate leaves and rather large heads.

36. **C. Macmahoni**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 327.—Tufted, forming small patches. Leaves numerous, crowded, rosulate, 1-1½ in. long including the sheath, linear-oblong, acute or subacute, thick and coriaceous, densely clothed on both surfaces with long white or buff silky hairs, 5-7-nerved beneath, margins flat; sheaths short, about as broad as the blade, glabrous above, with silky hairs beneath. Scapes stout, 3-5 in. long, densely villous with long silky hairs; bracts very numerous, narrow-linear. Head $\frac{3}{4}$ -1 in. diam.; involucral bracts numerous, linear, acute or acuminate, outer villous, inner hispid with short brownish hairs. Rays short, broad. Achene hispid.—*Students' Fl.* 291.

SOUTH ISLAND: Marlborough—Mount Stokes, alt. 3800 ft., rare, *MacMahon*! January.

A beautiful little plant, apparently with a very restricted distribution. I have seen no specimens except those gathered by Mr. MacMahon.

37. **C. parva**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 328.—Small, densely tufted, seldom more than 2-3 in. high. Leaves numerous, spreading; blade $\frac{1}{3}$ -1 in. long, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad, linear-lanceolate to oblong-lanceolate or narrow-oblong, acute, narrowed into a rather slender petiole and then expanded into a membranous cottony sheath as long as the blade, subcoriaceous, glabrous and often reticulated above, beneath clothed with white appressed tomentum; midrib usually evident; margins flat or slightly revolute, distinctly denticulate. Scape 1½-3 in. high, very slender, glabrate or slightly cottony; bracts 2-3, small, narrow-linear, sheathing and dilated at the base. Head $\frac{1}{2}$ - $\frac{2}{3}$ in. diam.; involucral bracts linear-lanceolate, acute, scarious, often reddish at the tips, glabrate or the outer slightly pilose. Rays narrow. Achene hispid.—*Kirk, Students' Fl.* 291.

SOUTH ISLAND: Nelson—Mountains at the source of the Heaphy River, *Dall*! December-January.

A very curious little plant. Mr. Dall's specimens are the only ones I have seen.

38. **C. sessiliflora**, *Hook. f. Handb. N.Z. Fl.* 135.—Much-branched at the base; each branch clothed with densely imbricating leaves, and forming a hard rosette 1-1½ in. diam., the rosettes usually compacted into broad flat patches 2-3 in. thick. Leaves very numerous, greenish-grey, most densely crowded, $\frac{1}{3}$ -1 in. long, about $\frac{1}{12}$ in. broad, narrow-linear or linear-subulate, obtuse or subacute, strict, rigid and coriaceous, hoary or silky on both surfaces,

flat above, convex on the back; sheath usually longer and broader than the blade, membranous, silky or villous. Head sunk among the leaves at the tip of the branch, very rarely exserted, $\frac{1}{2}$ –1 in. diam.; involucral bracts few, linear-subulate, scarious, cottony or the inner glabrate. Rays few, narrow, spreading. Achene silky.—*Kirk, Students' Fl.* 292.

SOUTH ISLAND: Abundant in mountain districts throughout. STEWART ISLAND: Summit of Mount Anglem, *Kirk!* 2500–5500 ft. December–January.

One of the most distinct species of the genus, often forming extensive carpets in open places on the mountains, easily recognised from a distance by the peculiar greenish-grey colour. Mr. Kirk's var. *pedunculata* is only a form in which the peduncle elongates after flowering.

39. **C. argentea**, *T. Kirk, Students' Fl.* 292.—Habit of *C. sessiliflora*, but more slender and much more branched; branches longer, 2–5 in., erect, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. Leaves numerous, crowded, densely imbricated, $\frac{1}{4}$ – $\frac{1}{2}$ in. long including the sheath, $\frac{1}{30}$ in. wide, linear-subulate, acute or subacute, coriaceous, flat or concave above, rounded on the back; sheaths longer and much broader than the blade, membranous, clothed with long silky hairs on the margins and back but often nearly glabrous in front. Head $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., deeply sunk among the leaves at the tip of the branch; involucral bracts few, linear, glabrate or slightly silky. Rays few, short. Achene silky.—*C. sessiliflora* var. *minor*, *Petrie in Trans. N.Z. Inst.* xv. (1883) 359.

SOUTH ISLAND: Otago—Summit of Maungatua, *Petrie!* STEWART ISLAND: Mount Anglem, Rakiabua, Smith's Lookout, *Kirk!* 500–3500 ft. December–January.

Closely allied to *C. sessiliflora*, but I think distinct.

40. **C. bellidioides**, *Hook. f. Handb. N.Z. Fl.* 135.—Rootstock much-branched, prostrate; branches numerous, much-divided, creeping and rooting at the base, erect at the tips. Leaves usually close-set, spreading, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad, linear-oblong or linear-spathulate, obtuse, gradually narrowed into rather short cottony petioles, coriaceous, veinless, green and glabrous on both surfaces; margins flat, entire or obscurely toothed. Scapes from near the tips of the branches, slender, 1–2 in. long, glabrous or slightly cottony; bracts numerous, leafy. Head $\frac{3}{4}$ in. diam.; involucral bracts few, narrow linear-oblong, acute or subacute, green with usually purple margins, glabrous. Rays numerous, spreading. Achene densely silky.—*Kirk, Students' Fl.* 292.

SOUTH ISLAND: Mountain districts from Nelson to the south of Otago, but often local. Usually on wet rocks or on shingle through which water flows. 2000–5000 ft. December–January.

A very distinct species, at once recognised by the glabrous branching habit, linear-spathulate green and almost fleshy leaves, and numerous leafy bracts.

41. **C. glandulosa**, Hook. f. *Fl. Nov. Zel.* i. 124.—Stem rather stout, sending out creeping and rooting leafy stolons. Leaves few, rosulate, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, ovate- or oblong-spathulate or obovate, acute or apiculate, narrowed into a winged petiole, acutely serrate or dentate, membranous, green on both surfaces, glabrous or more usually covered with minute glandular pubescence, veins reticulated; petioles expanded into a short sheath; margins often ciliate. Scape slender, 2–5 in. long, glandular-pubescent; bracts few, linear, acuminate. Head $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; involucre bracts in 2–3 rows, linear-subulate, erect or the outer recurved, glandular-pubescent, often ciliate at the tips. Rays few or many, spreading. Achene silky.—*Handb. N.Z. Fl.* 135; *Kirk, Students' Fl.* 293. *C. membranacea*, Col. in *Trans. N.Z. Inst.* xxii. (1890) 470.

NORTH ISLAND: Tongariro, Colenso! H. Hill! Rangipo Plain, G. Mair! Kirk! Petrie! SOUTH ISLAND: Not rare in mountain districts from Nelson to the west of Otago, usually in peaty swamps. 1500–4500 ft. December–January.

42. **C. vernicosa**, Hook. f. *Fl. Antarct.* i. 34, t. 26, 27.—Perfectly glabrous, leafy, densely tufted. Leaves very numerous, most densely crowded, rosulate, spreading, 1–4 in. long, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad, linear, straight or curved, obtuse or subacute, in small specimens often knobbed at the tip, rigid and coriaceous, polished and shining, entire or obscurely toothed, flat or convex above, margins recurved, midrib prominent beneath; sheath short, broad. Scapes usually numerous, 1–9 in. high, rather stout, often flexuose, clothed with leafy coriaceous bracts. Head 1– $1\frac{1}{2}$ in. diam.; involucre bracts linear, erect, margins often ciliate. Rays numerous, white, rather broad, spreading. Disc-florets purple; corolla-tube pilose. Achene hispid.—*Handb. N.Z. Fl.* 136; *Kirk, Students' Fl.* 293.

AUCKLAND AND CAMPBELL ISLANDS: Abundant from sea-level to over 1200 ft. November–December.

An exceedingly handsome plant, of which a beautiful plate is given in the “*Flora Antarctica*.” It and the following species are the only ones with purple disc-florets.

43. **C. Campbellensis**, Chapm. in *Trans. N.Z. Inst.* xxiii. (1891) 407.—Leaves rosulate, 3–6 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, lanceolate or obovate-lanceolate, obtuse or subacute, gradually narrowed to a short broad sheathing base, hardly coriaceous, glabrous above and longitudinally furrowed, sparingly tomentose and with prominent longitudinal ribs beneath; margins flat, finely and sharply serrate. Scapes 6–10 in. high, sparingly tomentose; bracts numerous, linear, sheathing at the base. Head $1\frac{1}{2}$ –2 in. diam.; involucre bracts linear, acute, glabrate or sparingly cottony, midrib evident. Rays spreading, white. Disc-florets purple; corolla-tube pilose. Achene hispid.—C. Chapmani, *Kirk in Gard. Chron.* ix. (1891) 731, fig. 146; *Students' Fl.* 293.

CAMPBELL ISLAND: Perseverance Harbour, rare, *Chapman, Kirk!*

The flower-heads closely resemble those of *C. vernicosa*, but the leaves are altogether different. I have only seen one poor specimen. Mr. Chapman's name has one month's priority of publication over Mr. Kirk's.

7. VITTADINIA, A. Rich.

Branched perennial herbs or small undershrubs, usually woody at the base. Leaves alternate, entire or toothed or lobed. Heads rather small, solitary and terminating the branches or forming loose terminal corymbs. Involucre hemispherical or campanulate; bracts in few series, imbricate, narrow, acute; margins scarious. Receptacle pitted, without scales. Ray-florets all female, numerous, crowded, ligulate. Disc-florets hermaphrodite, tubular, dilated upwards, usually 5-lobed. Anthers obtuse at the base. Style-branches narrow, somewhat flattened, with subulate tips. Achenes usually narrow, compressed, with or without ribs. Pappus copious, of numerous unequal capillary bristles.

A small genus of 8 or 10 species, found in Australia, Tasmania, New Caledonia, the Sandwich Islands, and extra-tropical South America.

1. *V. australis*, A. Rich. *Fl. Nouv. Zel.* 251.—A small much-branched herb 4–12 in. high, hard and woody at the base; branches numerous, decumbent or suberect, usually more or less hispid-pubescent or glandular, rarely almost glabrous. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in. long, obovate-spathulate to linear-cuneate, entire or 3–5-toothed or -lobed at the tip, narrowed into a broad flat petiole, hispid or pubescent. Heads solitary on short peduncles terminating the branches; involucre bracts few, in 2–3 series, linear-subulate, acute, erect, hispid or pubescent. Ray-florets in one series, usually exceeding the pappus, narrow, white, spreading. Disc-florets narrow, slender, longer than the involucre. Achene linear, compressed, obtuse at the tip, narrowed to the base, pubescent, usually with 5–8 striæ on each face. Pappus exceeding the achene.—*A. Cum.* *Precur.* n. 441; *Raoul, Choix*, 45; *Hook. f. Handb. N.Z. Fl.* 136; *Benth. Fl. Austral.* iii. 490; *Kirk, Students' Fl.* 294. *Eurybiopsis australis*, *Hook. f. Fl. Nov. Zel.* i. 125.

NORTH AND SOUTH ISLANDS: From the Great Barrier Island and Whangarei southwards, but local to the north of the East Cape. Sea-level to 3000 ft. November–January.

Also found in Australia and Tasmania, where it runs into numerous varieties, some of which differ widely from the type, and may prove to be distinct species. Of these var. *dissecta* (*Benth. Fl. Austral.* iii. 491) has become naturalised near Nelson. It can be distinguished by the leaves being pinatifid, with the segments again lobed, and by the purple ray-florets. Two other closely allied forms (var. *linearis* and var. *erecta*, *Kirk, "Students' Flora,"* 295), with linear or linear-spathulate leaves $\frac{3}{4}$ –1 $\frac{1}{2}$ in. long and purple rays, have established themselves in the interior of Otago and elsewhere in the South Island.

8. **HAASTIA**, Hook. f.

Densely or laxly tufted perennial herbs, often forming large rounded or amorphous masses in alpine localities; root stout, branched, often very long; branches hard and woody, altogether concealed by the persistent leaves. Heads large, solitary at the tips of the branches, sessile and sunk among the uppermost leaves. Involucre hemispherical or broadly campanulate; bracts in about two series, linear, with scarious tips, the inner usually narrower, almost glabrous, the outer broader, densely woolly. Receptacle flat, papillose. Outer florets numerous, female, in 2 or several series; corolla very short, slender, narrow-tubular, minutely 5-toothed; style-branches long, far-exserted. Disc-florets numerous, hermaphrodite, funnel-shaped, 5-toothed; style-branches not so long. Achene linear-oblong, glabrous, subterete, smooth or obscurely grooved. Pappus-hairs of one series of numerous rather rigid bristles, thickened at the tips.

A very remarkable and distinct genus, confined to New Zealand.

- | | |
|---|---------------------------|
| Forming compact pulvinate masses. Leaves most densely imbricate, broadly obcuneate, crenulate at the tip .. | 1. <i>H. pulvinaris</i> . |
| Laxly branched, rufous or fulvous. Leaves loosely imbricated, obovate-spathulate, sharply recurved. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. .. | 2. <i>H. recurva</i> . |
| Laxly branched, whitish or pale fulvous. Leaves loosely imbricated, oblong-obovate, flat, suberect. Heads $\frac{3}{4}$ – $1\frac{1}{2}$ in. .. | 3. <i>H. Sinclairii</i> . |
| Small, densely tufted, fulvous. Leaves densely imbricated, obovate-cuneate, clothed with long straight hairs .. | 4. <i>H. Greenii</i> . |

1. ***H. pulvinaris***, Hook. f. *Handb. N.Z. Fl.* 156.—Forming large rounded or amorphous cushion-like masses 3–6 ft. diam. or more. Root long, stout, branched. Branches numerous, densely compacted, with the persistent leaves $\frac{3}{4}$ in. diam. Leaves spreading, most closely imbricated, thickly clothed with pale fulvous wool, especially towards the tips, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, broadly obcuneate, gradually narrowed to a broad sessile base, membranous below, tip thickened and provided on the upper surface with numerous fleshy projections, giving it a crenulate appearance, 3-veined when the wool is removed, veins anastomosing above. Head $\frac{1}{3}$ in. diam.; involucre bracts in 1–2 series, narrow-linear, free. Achene linear-oblong, glabrous, not ribbed. Pappus-hairs free at the base.—*Ic. Plant.* t. 1003; *Kirk, Students' Fl.* 295.

SOUTH ISLAND: Nelson—Summit of Gordon's Nob, *T. F. C.*; mountains above the Wairau Gorge, *Sinclair, T. F. C.*; Discovery Peaks, *Travers*; Mount Captain, *Kirk! T. F. C.*; Lake Tennyson, *T. F. C.* Marlborough—Mount Mouatt, Awatere, *Sinclair, Kirk!* Kaikoura Mountains, *Buchanan!* 4000–6500 ft. *Vegetable sheep.* December–January.

One of the most remarkable plants known. The branches are everywhere covered and altogether concealed by the densely imbricated woolly leaves, and are so closely compacted that it is impossible to thrust the finger in between. In

fact, the whole plant has the appearance of a woolly cushion marked with mamillated projections corresponding to the tips of the branches. The flower-heads are sunk in the top of these projections, and are almost hidden by the woolly hairs of the leaves. For a detailed account of the vegetative organs of the plant, and its minute anatomy, reference should be made to a paper by Miss E. Low in the Trans. N.Z. Inst. xxxii. 150.

2. *H. recurva*, Hook. f. *Handb. N.Z. Fl.* 156. — Forming laxly branched masses 3–9 in. broad, everywhere covered with soft dense fulvous or rufous wool; branches spreading, open, with the leaves $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. Leaves laxly imbricating, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, obovate or obovate-spathulate, sharply recurved about the middle; the lower half loosely sheathing the branch, thin and membranous, veined, clothed with long woolly hairs; the upper half thicker, with the superior surface much puckered and wrinkled, with corresponding reticulations beneath, both surfaces covered with densely compacted wool. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; involucral bracts in one series, linear, erect, densely woolly on the outside, glabrous within. Achene glabrous, not ribbed. Pappus-hairs free or very obscurely connate at the base.—*Kirk, Students' Fl.* 296.

SOUTH ISLAND: Nelson—Mount Peel, *T. F. C.*; Wairau Gorge, *Sinclair, T. F. C.*; Discovery Peaks, *Travers*; Clarence Valley, *T. F. C.* Marlborough—Kaikoura Mountains, *Buchanan*! Canterbury—Mount Torlesse and mountains of the Broken River basin, *Haast, Enys*! *Petrie*! *Cockayne*! *T. F. C.*; Mount White, *Armstrong*! Usually on dry shingle slopes. 4000–6500 ft. December–January.

3. *H. Sinclairii*, Hook. f. *Handb. N.Z. Fl.* 156. — Loosely tufted, much or sparingly branched, often simple. Branches decumbent or suberect, 3–9 in. long. Leaves erect or rarely spreading, laxly imbricating, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, oblong-obovate or rounded-obovate, flat, everywhere densely clothed with white or pale fulvous wool, thin and membranous towards the base, 5–7-veined when the wool is removed, upper portion thicker and slightly rugose. Heads large, $\frac{3}{4}$ –1 $\frac{1}{4}$ in. diam.; involucral bracts in 2 series, with scarious tips, linear or linear-obovate, outer densely woolly, the inner nearly glabrous. Achene linear-oblong, smooth and glabrous, not ribbed. Pappus-hairs free to the base.—*lc. Plant.* t. 1003; *Kirk, Students' Fl.* 296. *H. montana*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 215.

SOUTH ISLAND: Not uncommon on dry shingle slopes in alpine localities from Nelson to the west of Otago. 4000–6500 ft. December–January.

Allied to the preceding, but distinguishable by the less-branched habit, paler wool, flat leaves, and larger heads.

4. *H. Greenii*, Hook. f. *ex T. Kirk Students' Fl.* 296. — “Densely tufted, about 2 in. high; stems with the leaves $\frac{1}{3}$ in. diam. Leaves densely imbricating all round the stem, $\frac{1}{3}$ in. long, obovate-cuneate, rounded at the tip, thickly clothed on both surfaces with long straight hairs which meet beyond the margin and completely hide the leaves. Flowers unknown.”

SOUTH ISLAND: Canterbury—Mount Cook, alt. 6500 ft., *Rev. W. S. Green*.

This is quite unknown to me, and in the absence of additional information I have reproduced Mr. Kirk's description. It was discovered during the *Rev. W. S. Green's* adventurous ascent of Mount Cook, and has not since been met with.

9. GNAPHALIUM, Linn.

Hoary or woolly annual or perennial herbs. Leaves alternate, quite entire. Heads rather small, corymbose or fascicled or solitary, heterogamous and discoid. Involucre ovoid or campanulate; bracts imbricate in several series, more or less scarious, the inner sometimes with white spreading tips. Receptacle naked or pitted. Florets of the circumference all female, in 2 or more rows, numerous, filiform, minutely 3-4-toothed. Disc-florets hermaphrodite, fewer in number, tubular with a funnel-shaped 5-toothed mouth. Anthers sagittate at the base, produced into fine tails. Style-branches of the disc-florets nearly terete, truncate or capitate. Achenes oblong or obovoid, not ribbed. Pappus-hairs in one series, slender or thickened at the tip, caducous, often connate at the base.

A large genus, spread over the whole world, hardly distinguishable from *Helichrysum* and others except by the more numerous female flowers. Of the New Zealand species two are widely distributed in many countries, two others extend to Australia, the remainder are endemic.

A. Inner involucre bracts white and radiating. Heads corymbose.

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| Stems robust. Leaves 2-4 in. \times $\frac{1}{4}$ - $\frac{3}{4}$ in., oblong-lanceolate, 3-nerved beneath. Heads $\frac{1}{2}$ in. diam. | 1. <i>G. Lyallii</i> . |
| Stems slender, prostrate or decumbent. Leaves $\frac{1}{2}$ -1 in., obovate-spathulate, faintly 3-nerved above. Heads $\frac{1}{2}$ - $\frac{1}{3}$ in. diam. | 2. <i>G. trinerve</i> . |
| Stems slender. Leaves $\frac{1}{2}$ -2 $\frac{1}{2}$ in. \times $\frac{1}{8}$ - $\frac{1}{2}$ in., linear-lanceolate. Heads $\frac{1}{3}$ in. diam. | 3. <i>G. Keriense</i> . |
| Stems branched, slender, rigid. Leaves $\frac{1}{2}$ -1 $\frac{1}{4}$ in. \times $\frac{1}{10}$ - $\frac{1}{20}$ in., narrow-linear, margins recurved. Heads $\frac{1}{3}$ in. | 4. <i>G. subrigidum</i> . |

B. Inner involucre bracts not white and radiating.

* Heads solitary, terminal.

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| Small, 1-4 in. high, simple or branched below. Leaves $\frac{1}{2}$ -2 in., linear-obovate, white on both surfaces. Head $\frac{1}{3}$ in. diam. | 5. <i>G. Traversii</i> . |
| Small, 1-2 in. high, solitary or tufted. Leaves $\frac{1}{3}$ -1 in., linear-spathulate, white beneath. Heads $\frac{1}{3}$ in. diam. | 6. <i>G. paludosum</i> . |
| Small, stems short, tufted. Leaves imbricate, $\frac{1}{8}$ in., linear, silky on both surfaces. Head $\frac{1}{2}$ in. diam. | 7. <i>G. nitidulum</i> . |

** Heads numerous, corymbose, ebracteate.

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| Stems 3-18 in. Leaves 1-3 in., linear or linear-spathulate, white and woolly on both surfaces | 8. <i>G. luteo-album</i> . |
|---|----------------------------|

*** Heads compacted into a dense glomerule, with linear bracts at the base.

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|---|--------------------------|
| Annual, stems 6-20 in., branched, erect, leafy. Glomerules $\frac{1}{2}$ -1 in. diam. | 9. <i>G. japonicum</i> . |
| Perennial, with creeping stolons. Stems 3-12 in., simple. Leaves mostly radical. Glomerules smaller | 10. <i>G. collinum</i> . |

1. *G. Lyallii*, *Hook. f. Fl. Nov. Zel.* i. 137.—Stems 1–2 ft. high, stout, branched, decumbent or prostrate at the woody base, then erect, cottony above. Leaves close-set or the upper remote, spreading, 2–4 in. long, $\frac{1}{4}$ – $\frac{3}{4}$ in. broad, narrow oblong-lanceolate or narrow obovate-lanceolate, acute, gradually narrowed to a sessile base, membranous, glabrous above, beneath clothed with thinly appressed white tomentum and distinctly 3-nerved. Heads rather large, $\frac{1}{2}$ in. diam., disposed in many-flowered terminal corymbs 2–4 in. across; pedicels cottony. Involucral bracts numerous, scarious, white, radiating, with short woolly claws. Female florets very numerous, disc-florets much fewer. Achene linear-oblong, smooth, glabrous. Pappus-hairs few, very slender.—*Handb. N.Z. Fl.* 152; *Kirk, Students' Fl.* 297. *G. adhærens*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 244.

NORTH ISLAND: Ruahine Range, *Colenso! Andrew, Howlett!* Murimotu and Moawhango, *Petrie!* Rimutaka Range, *Kirk!* SOUTH ISLAND: Not uncommon along the western side from Collingwood to the Otira Gorge and southwards to Milford Sound. Sea-level to 2500 ft. November–January.

A handsome plant, in its usual state at once recognised by the large size, broad distinctly 3-nerved leaves, and large heads. But small states with narrower leaves and smaller heads are difficult to separate from *G. Keriense*, and there is little doubt that the two species pass into one another. In both *G. Lyallii* and *Keriense* the disc-florets are frequently sterile, showing a tendency in the heads to become unisexual.

2. *G. trinerve*, *Forst. Prodr.* n. 289.—Stems 1–2 ft. long, rather slender, sparingly branched, prostrate or decumbent, glabrate below, more or less white and cottony above. Leaves distant, spreading or deflexed, $\frac{1}{2}$ –1 in. long, obovate-lanceolate or spatulate, broadest towards the tip, acute or apiculate, gradually narrowed to a broad base, glabrous above and faintly 3-nerved, white with appressed wool beneath. Heads in corymbs of 3 to 10 or solitary, terminating the branches, which are produced into slender cottony bracteate peduncles, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam. Involucral bracts numerous, white, radiating, the outer woolly at the base. Achene linear-oblong, glabrous. Pappus-hairs few, slender.—*A. Rich. Fl. Nouv. Zel.* 239; *A. Cunn. Precur.* n. 455; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 138; *Handb. N.Z. Fl.* i. 153; *Kirk, Students' Fl.* 297.

NORTH ISLAND: Rimutaka Range, *Kirk!* SOUTH ISLAND: West coast of Nelson to Westland and Milford Sound, south and east coasts of Otago; not uncommon. Sea-level to 2000 ft. November–December.

Closely allied to the preceding, but sufficiently characterized by the more slender stems, shorter obovate-spatulate leaves, which are seldom 3-nerved beneath, and by the bracteate peduncles.

3. *G. Keriense*, *A. Cunn. Precur.* n. 454.—Stems short or long, prostrate or decumbent, with numerous erect or ascending leafy branches 3–9 in. long, cottony above. Leaves spreading,

$\frac{1}{2}$ – $2\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{2}$ in. broad, narrow linear-lanceolate to oblong-lanceolate or spathulate-lanceolate, acute, gradually narrowed to the base, glabrous above, beneath white with appressed cottony tomentum but with the midrib evident, rarely faintly 3-nerved. Heads small, $\frac{1}{3}$ in. diam., in many-flowered corymbs terminating the branches, which are produced into leafy or bracteate cottony peduncles. Involucral bracts numerous, white, radiating; outer cottony at the base. Achene minute, glabrous. Pappus-hairs few, very slender.—*Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 138; *Handb. N.Z. Fl.* 153; *Kirk, Students' Fl.* 298. *G. novæ-zealandiæ*, *Sch. Bip. in Bot. Zeit.* iii. (1845) 171. *Helichrysum micranthum*, *A. Cunn. ex D.C. Prodr.* vi. 189.

NORTH ISLAND: Abundant by the sides of streams, &c., from Mongonui to Cook Strait. SOUTH ISLAND: Nelson, *Travers*; Wangapeka Valley, *T. F. C.*; Dusky Bay, *Lyall*. Sea-level to 2000 ft. October–December.

4. *G. subrigidum*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 245.—Stems usually much branched, sometimes almost bushy, erect or decumbent at the base, woody, 9–20 in. long; branches slender, brittle, somewhat rigid, glabrous or cottony at the tips. Leaves close-set, spreading, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, $\frac{1}{10}$ – $\frac{1}{15}$ in. broad, very narrow-linear or narrow linear-spathulate, acute or apiculate, stiff and coriaceous, glabrous above, white with appressed tomentum beneath, but with the midrib evident; margins recurved. Heads very numerous, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., in broad many-flowered corymbs at the ends of the branches; pedicels usually very slender, almost capillary, white and cottony. Involucral bracts white and radiating. Achene and pappus as in *G. Keriense*.—*G. Keriense* var. *linifolia*, *Hook. f. Fl. Nov. Zel.* i. 138; *Handb. N.Z. Fl.* 153; *Kirk, Students' Fl.* 298.

NORTH ISLAND: Dry rocky banks from the East Cape and Taupo to Wanganui; not uncommon. Sea-level to 2000 ft. October–December.

This has generally been treated as a variety of *G. Keriense*, from which it differs in the more rigid erect and bushy habit, much narrower stiff and coriaceous leaves with recurved margins, and almost capillary pedicels. It deviates quite as much from *G. Keriense* as *Lyallii* and *trinerve* do, and for the sake of consistency should be considered as distinct, unless the four species are merged into one.

5. *G. Traversii*, *Hook. f. Handb. N.Z. Fl.* 154.—A dwarf tufted perennial herb 1–4 in. high, simple or branched below, sometimes forming small patches. Leaves radical, petiolate, $\frac{1}{3}$ –2 in. long, linear-spathulate or linear-obovate, clothed on both surfaces with soft cottony wool, petiole long or short. Scapes erect, variable in length, $\frac{1}{2}$ –3 in., white with cottony wool; bracts 1–3, linear. Head solitary, terminal, $\frac{1}{3}$ in. diam.; involucral bracts in about 3 series, erect, linear, obtuse, pale brownish-yellow, scarious and hyaline, shining; outer shorter and broader, cottony at the base. Female

florets very numerous, with a few hermaphrodite ones in the centre. Achene puberulous or glabrous. Pappus-hairs copious, very fine, connate at the base.—*Benth. Fl. Austral.* iii. 655; *Kirk, Students' Fl.* 299.

Var. **Mackayi**, T. Kirk, l.c.—Much branched, densely tufted, forming close matted patches. Leaves imbricated on the short branches, heads smaller, sessile or on short scapes. Involucral bracts not so numerous, acute.—*Raoulia Mackayi*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 354, t. 34, f. 2.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to Foveaux Strait. 1500–5500 ft. December–February. Also in Australia.

A variable plant. The most developed form is almost simple, with long radical leaves and long and slender scapes; but it passes by almost imperceptible gradations into the extreme state of var. *Mackayi*, which forms broad much-branched patches, with short imbricated leaves and sessile heads.

6. **G. paludosum**, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 441.—Very slender, solitary or tufted, 1–2 in. high. Leaves all radical, petiolate, $\frac{1}{3}$ – $1\frac{1}{2}$ in. long, narrow linear-spathulate; blade half the length or nearly so, acute or subacute, rather membranous, glabrous or slightly silky above, beneath clothed with white appressed tomentum; midrib prominent; margins flat or slightly recurved. Scapes few, hardly exceeding the leaves in the flowering stage, but elongating in fruit, very slender, almost capillary, cottony; bracts few, small, linear. Head solitary, terminal, $\frac{1}{2}$ in. diam.; involucral bracts few, scarious, pale and glistening, darker at the tips, inner linear, glabrous. Female florets very numerous. Achene linear-oblong, papillose. Pappus-hairs very delicate, connate at the base.—*Kirk, Students' Fl.* 299. *G. minutulum*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 472.

NORTH ISLAND: Base of Tongariro, *Hill!* Rangipo Plains and Ruahine Mountains, *Petrie!* SOUTH ISLAND: Not uncommon in mountain districts, usually in peaty swamps, from Nelson to Otago. 1000–4000 ft. December–January.

Closely allied to *G. Traversii*, but easily separated by the smaller size and more slender habit, thinner leaves glabrous on the upper surface, smaller heads, and fewer involucral bracts with dark tips. The type specimens of Mr. Colenso's *G. minutulum* are identical with Mr. Petrie's plant.

7. **G. nitidulum**, *Hook. f. Handb. N.Z. Fl.* 154.—“A small densely tufted species, covered with appressed silky shining yellowish tomentum. Leaves closely imbricated at their bases, above spreading, flat, $\frac{1}{3}$ in. long, linear, obtuse; lower $\frac{1}{3}$ membranous, glabrous, upper $\frac{2}{3}$ densely silky. Heads terminal, solitary, large, $\frac{1}{2}$ in. broad, on very short slender peduncles; involucral scales in 2 series, erect, linear, hyaline, shining, with pale erect tips; florets not seen.”—*Kirk, Students' Fl.* 299.

SOUTH ISLAND: “Nelson Mountains, *Sinclair*; Clarence and Wairau Valleys, alt. 3500 ft., *Travers.*”

This plant has apparently not been collected since its original discovery nearly fifty years ago. Not having seen specimens, I have reproduced Hooker's description.

8. *G. luteo-album*, *Linn. Sp. Plant.* 851.—Annual or rarely biennial, clothed in all its parts with soft white woolly tomentum. Stems erect, ascending or decumbent, simple or branched at the base, 3–18 in. high. Lower leaves often petiolate, 1–3 in. long, linear or linear-spathulate to obovate-spathulate, obtuse or acute; upper smaller, sessile, linear or lanceolate, acute. Heads $\frac{1}{2}$ in. diam., pale-yellow or brownish-yellow, glistening, in dense ebracteate clusters arranged in a corymbose manner at the ends of the branches. Involucre almost globose; bracts erect, oblong, obtuse, scarious, tips incurved. Female florets exceedingly numerous; hermaphrodite ones few. Achene minutely papillose.—*A. Rich. Fl. Nouv. Zel.* 236; *A. Cunn. Precur.* n. 450; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* 138; *Handb. N.Z. Fl.* 154; *Kirk, Students' Fl.* 298.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Abundant throughout from sea-level to fully 3000 ft. November–March.

A common plant in almost all warm and many temperate countries.

9. *G. japonicum*, *Thunb. Fl. Jap.* 311.—Annual, erect, 6–20 in. high. Stems often woody at the base, branched, more or less white and cottony. Leaves scattered, 1–4 in. long, oblong-spathulate or linear-spathulate to linear-lanceolate, the lower often petiolate, acute, glabrous above or nearly so, cottony-white beneath. Heads small; $\frac{1}{8}$ – $\frac{1}{4}$ in. long, compacted into dense globose clusters or compound heads $\frac{1}{4}$ –1 in. diam., which either terminate the branches or are axillary, and are surrounded by 3–6 linear spreading floral leaves. Involucral bracts scarious, hyaline, erect, obtuse or the inner acute. Female florets very numerous; hermaphrodite ones few, sometimes solitary. Achene slightly compressed, glabrous. Pappus-hairs very slender, hardly connate at the base.—*Benth. Fl. Austral.* iii. 653; *Kirk, Students' Fl.* 300. *G. involucratum*, *Forst. Prodr.* n. 291; *A. Rich. Fl. Nouv. Zel.* 241; *A. Cunn. Precur.* n. 453; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 139; *Handb. N.Z. Fl.* 155. *G. virgatum*, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i. 139. *G. lanatum*, *Forst. Prodr.* n. 290; *A. Cunn. Precur.* n. 452. *G. Cunninghamii*, *D.C. Prodr.* vi. 235.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout from sea-level to 2500 ft. November–January.

Found also in Norfolk Island, Lord Howe's Island, Australia and Tasmania) and northwards to the Malay Archipelago, China, and Japan.

10. *G. collinum*, *Lab. Pl. Nov. Holl.* ii. 44, t. 189.—A tufted perennial herb 3–12 in. high, usually with creeping and rooting stolons and slender erect cottony stems. Leaves mostly radical, very variable in size, $\frac{1}{3}$ –3 in. long, lanceolate-spathulate or oblong-spathulate, acute or obtuse, petiolate, white and cottony on both surfaces or glabrate above; cauline leaves much smaller and narrower, linear-spathulate, sessile. Heads small, compacted into dense clusters or compound heads similar to those of *G. japonicum*, but smaller and not so compact, and with fewer smaller subtending floral leaves. Involucres broader than in *G. japonicum*; bracts linear-oblong, obtuse, scarious and hyaline. Florets and achenes as in *G. japonicum*.—*Hook. f. Fl. Nov. Zel.* i. 139; *Handb. N.Z. Fl.* 155; *Benth. Fl. Austral.* ii. 654; *Kirk, Students' Fl.* 300. *G. simplex*, *A. Rich. Fl. Nouv. Zel.* 237; *A. Cunn. Precur.* n. 451.

Var. *obscurum*, *Kirk, Students' Fl.* 300.—Forming grey matted patches seldom more than 1 in. high. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., linear, glabrate above, grey with appressed tomentum beneath. Scape leafy or almost wanting. Heads in terminal fascicles of 2–4 or solitary. Involucral bracts 3–10, linear, obtuse.

Var. *monocephalum*, *Kirk, l.c.*—Very small. Leaves all radical, $\frac{1}{2}$ in. long, linear, obtuse or acute. Head solitary, sessile or on a slender filiform scape $\frac{1}{2}$ –1 in. high.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Plentiful from sea-level to 4500 ft. November–March. The two varieties not uncommon on the mountains of the South Island.

Luxuriant forms of this are best distinguished from *G. japonicum* by being perennial, by the creeping stolons, smaller glomerules with fewer floral leaves, and by the broader involucres. It is also a native of Australia and Tasmania.

10. *RAOULIA*, *Hook. f.*

Perennial herbs, usually of small size, either densely tufted and compacted or creeping and matted. Leaves small, alternate, entire, often closely imbricated. Heads small, solitary, terminal, sessile or nearly so, heterogamous and discoid. Involucre oblong, campanulate or hemispherical; bracts imbricated in 2–3 series, the inner ones often with white radiating tips. Receptacle narrow, flat or convex, naked. Florets of the circumference in 1 or 2 rows, female, filiform, 2–3-toothed. Disc-florets hermaphrodite, tubular with a funnel-shaped 5-toothed mouth. Anthers sagittate at the base, produced into fine tails. Style-branches nearly terete, truncate or subcapitate. Achenes oblong. Pappus-hairs in one or several series, slender or thickened at the tip.

A genus founded more upon habit than upon really good and distinctive characters. It may be said to be intermediate between the *Eugnaphalieæ* and *Helichryseæ*, the female and disc florets being often nearly equal in number. It is easily divided into two sections by the remarkable differences between the pappus-hairs, which may ultimately, when the Gnaphalioid *Compositæ* are thoroughly worked out, be found sufficient to constitute separate genera. Several of the species are difficult of discrimination, and require further examination,

this being specially the case with those to which, on account of the remarkable habit, the popular name of vegetable sheep has been applied. It is quite possible that several species are confounded under *R. eximia* and allied forms. All the New Zealand species are endemic, and in addition there are one or two found in Australia and Tasmania.

A. Leptopappus. Pappus-hairs in several series, copious, very slender, not thickened upwards.

* Inner involucrel bracts without white radiating tips.

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| Leaves $\frac{1}{2}$ in., erect or recurved, spathulate, obtuse, white and silvery. Florets 12-20 | 1. <i>R. australis</i> . |
| Leaves $\frac{1}{2}$ in., spreading or recurved, linear-oblong or spathulate, acute or apiculate, glabrate or tomentose. Florets 10-16 | 2. <i>R. tenuicaulis</i> . |
| Leaves $\frac{1}{2}$ in., erecto-patent, ovate-subulate from a broad base, glabrate. Florets 4-8 | 3. <i>R. Haastii</i> . |
| Leaves $\frac{1}{2}$ in., spreading and recurved, linear, obtuse, grey with silky tomentum; margins involute. Florets 15-20 | 4. <i>R. Monroi</i> . |

** Inner involucrel bracts with white radiating tips.

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|---|---------------------------|
| Stems slender, forming loose patches. Leaves laxly imbricate, erecto-patent, linear-oblong, glabrous or nearly so | 5. <i>R. glabra</i> . |
| Stems stout, matted. Leaves closely imbricate, erecto-patent, linear-oblong, silky or glabrate | 6. <i>R. subsericea</i> . |
| Stems stout, matted. Leaves closely imbricate, spreading and recurved, obovate-spathulate, densely tomentose | 7. <i>R. Parkii</i> . |

B. Imbricaria. Pappus-hairs in one series, few, rigid, thickened upwards.

* Inner involucrel bracts without white radiating tips.

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| Leaves spreading, glabrous, rigid, subulate | 8. <i>R. subulata</i> . |
| Forming hard compact masses. Leaves most densely imbricate, linear-obovate, upper $\frac{1}{2}$ with a dense tuft of hairs concealing the leaf | 9. <i>R. eximia</i> . |
| Forming broad patches. Leaves ovate, obtuse, clothed with silvery tomentum, grooved on the back when dry | 10. <i>R. Hectori</i> . |

** Inner involucrel bracts with white radiating tips.

- | | |
|---|-----------------------------|
| Stems tufted, often simple. Leaves $\frac{1}{2}$ - $\frac{1}{3}$ in., ovate-subulate, silvery. Heads large, $\frac{1}{2}$ - $\frac{3}{4}$ in. | 11. <i>R. grandiflora</i> . |
| Stems laxly branched. Leaves $\frac{1}{2}$ - $\frac{1}{4}$ in., recurved, obovate-spathulate. Heads $\frac{1}{2}$ in. Florets 30-50 | 12. <i>R. Petriensis</i> . |
| Forming compact masses. Leaves densely imbricate, obovate-spathulate, upper part clothed on both surfaces with dense straight hairs concealing the leaf | 13. <i>R. mammillaris</i> . |
| Forming compact masses. Leaves densely imbricate, obovate-spathulate, upper part clothed on both surfaces with dense straight hairs concealing the leaf, but extreme tip naked. Florets red | 14. <i>R. rubra</i> . |
| Forming compact masses. Leaves densely imbricate, broadly cuneate or flabellate, truncate, tip of upper surface clothed with straight dense hairs, beneath glabrous and corrugated | 15. <i>R. Buchanani</i> . |

Forming compact greenish masses. Leaves densely imbricate, linear-oblong, truncate, tip of upper surface clothed with straight dense hairs, naked beneath .. 16. *R. Goyeni*.

Forming compact patches. Leaves densely imbricate, erecto-patent, tips clothed on both surfaces with appressed silky tomentum 17. *R. bryoides*.

1. *R. australis*, *Hook. f. ex Raoul, Choix de Plantes*, 20, t. 15.—Forming broad flat patches. Stems 1–6 in. long, much interlaced, prostrate and rooting; branches numerous, closely packed, short, erect, $\frac{1}{2}$ – $1\frac{1}{2}$ in. high. Leaves laxly or densely imbricated, erect or spreading or recurved, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, linear- or obovate-spathulate to rounded spathulate, obtuse at the tip, concave, more or less clothed on both surfaces with white or yellowish tomentum, especially towards the tip. Heads $\frac{1}{8}$ – $\frac{1}{4}$ in. long; involucre bracts in 2–3 series; outer spathulate, tomentose; inner linear, obtuse, scarious, shining, pale-yellow. Florets from 12 to 20 or more, the females equalling or exceeding the hermaphrodite ones in number. Achene glabrous or minutely pubescent. Pappus-hairs very numerous, extremely slender, not thickened at the tips.—*Fl. Nov. Zel.* i. 135; *Handb. N.Z. Fl.* 148; *Kirk, Students' Fl.* 302. *R. Mackayi*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 354, t. 34, f. 2. *R. albosericea*, *Col. in Trans. N.Z. Inst.* xx. (1888) 195.

Var. *apice-nigra*, *Kirk, Students' Fl.* 302.—Leaves more densely tomentose, white with soft woolly hairs. Outer involucre bracts black at the tips.—*R. apice-nigra*, *Kirk in Trans. N.Z. Inst.* xi. (1879) 464.

Var. *lutescens*, *Kirk, l.c.*—Smaller. Leaves densely imbricating, shorter, $\frac{1}{10}$ – $\frac{1}{2}$ in. long. Heads smaller; involucre bracts bright-yellow.

NORTH ISLAND: From the East Cape and the Upper Thames Valley southwards, but often local. SOUTH ISLAND: Abundant throughout. STEWART ISLAND: Mason Bay, *Kirk*! Sea-level to 5500 ft. December–January.

A very variable plant, especially in the size and shape of the leaves, and the extent to which they are clothed with white tomentum. Mr. Colenso describes his *R. albosericea* as having few florets and few pappus-hairs; but the specimens in his herbarium are long past flowering, and have evidently lost most of the florets and much of the pappus, and apparently do not differ from the type in any essential character.

2. *R. tenuicaulis*, *Hook. f. Fl. Nov. Zel.* i. 135, t. 36A.—Stems slender, prostrate and creeping, much and laxly branched, 1–10 in. long; branches ascending at the tips. Leaves laxly imbricating, spreading or recurved, $\frac{1}{5}$ – $\frac{1}{10}$ in. long, linear-oblong or lanceolate-spathulate, or on luxuriant shoots obovate-spathulate, acuminate or apiculate, concave, more or less clothed with greyish appressed tomentum or almost glabrous. Heads $\frac{1}{8}$ – $\frac{1}{4}$ in. long; involucre bracts in 3 series; outer tomentose or glabrate, acute; inner scarious, with brown acute or obtuse tips. Florets from 10 to 16, the females about equalling the hermaphrodite ones in number. Achene glabrate or puberulous. Pappus-hairs copious, very slender.—*Handb. N.Z. Fl.* 148; *Kirk, Students' Fl.* 302.

Var. **pusilla**, *Kirk, Students' Fl.* 302.—Smaller, glabrous or nearly so, much more closely branched; branches $\frac{1}{8}$ – $\frac{1}{2}$ in. high. Leaves $\frac{1}{20}$ – $\frac{1}{12}$ in., linear, acute, concave. Female florets almost twice as numerous as the hermaphrodite ones.

NORTH AND SOUTH ISLANDS: Not uncommon from the Thames goldfields southwards, usually on gravelly or sandy river-beds. Var. *pusilla*: Rimutaka Range, *Kirk!* mountains flanking the Wairau Valley, *T. F. C.* Sea-level to 5000 ft. December–January.

Easily distinguished by the slender habit, narrow acute or apiculate leaves with greyish tomentum, and brown-tipped involucre bracts.

3. **R. Haastii**, *Hook. f. Handb. N.Z. Fl.* 148.—Glabrous or nearly so, forming small dense patches. Stems short, rather stout, prostrate; branches numerous, closely packed, $\frac{1}{2}$ –1 in. high, rarely more. Leaves densely imbricated, erecto-patent, $\frac{1}{16}$ in. long, with a broad membranous sheathing base and much narrower ovate-subulate coriaceous tip, concave, quite glabrous or obscurely silky or woolly. Heads $\frac{1}{8}$ in. long; involucre bracts in 2–3 series, scarious, linear, obtuse, not brown at the tips. Florets few, 4 to 8; 2–4 of them female. Achene puberulous. Pappus-hairs copious, slender, not thickened above.—*Kirk, Students' Fl.* 302.

SOUTH ISLAND: Nelson—Waiau Valley, *Sinclair, Travers*; Amuri, *Kirk!* Clarence Valley, *T. F. C.* Canterbury—Kowai River, *Haast!* Upper Waimakariri and Broken River, *Kirk!* *T. F. C.* Otago—Kyeburn Crossing, Maniototo County, *Petrie!* 1000–3000 ft. November–December.

Separated from *R. tenuicaulis* by the shorter leaves with broad bases and ovate-subulate tips, and by the narrower few-flowered heads.

4. **R. Monroi**, *Hook. f. Handb. N.Z. Fl.* 148.—Stems wiry, creeping, much interlaced, forming broad patches; rootlets long, filiform; branches slender, ascending, silky, 1–2 in. high or more. Leaves laxly or densely imbricate, rarely distant, spreading and recurved, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear or linear-spathulate, obtuse, uniformly clothed on both surfaces with greyish-white appressed tomentum; margins incurved. Heads narrow, $\frac{1}{8}$ in. long; involucre bracts in 3–4 series; the outer oblong, tomentose; the inner longer and narrower, scarious, with brown obtuse tips. Florets from 15 to 20, the females the most numerous. Achene oblong, puberulous. Pappus-hairs copious, slender, not thickened at the tips.—*Kirk, Students' Fl.* 303.

SOUTH ISLAND: Not uncommon in dry gravelly and sandy places in Marlborough, Canterbury, and Otago. Sea-level to 3500 ft. November–January.

Easily recognised by the uniform greyish-white colour, linear spreading and recurved leaves, and narrow heads with brown-tipped involucre scales.

5. **R. glabra**, *Hook. f. Fl. Nov. Zel.* i. 135.—Stems long, slender, prostrate, much branched, forming lax patches 3–24 in. across; branches ascending, 1–3 in. long. Leaves pale yellow-

green, laxly imbricated or somewhat remote, spreading or erectopatent, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, linear-ligulate or linear-oblong, acute or obtuse, flat or nearly so, 1-nerved, glabrous or slightly silky, sometimes with a minute pencil of hairs at the tip. Heads rather large, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam.; involucre bracts in 3–4 series; outer green, ovate-oblong, acuminate; inner longer, linear-oblong, with white radiating tips. Florets numerous, 30–50; female in 2 series, rather less in number than the hermaphrodite ones. Achene puberulous. Pappus-hairs copious, soft, not thickened at the tips.—*Handb. N.Z. Fl.* 149; *Kirk, Students' Fl.* 303.

NORTH ISLAND: Tararua and Rimutaka Mountains, descending almost to sea-level to the north of Cape Palliser. SOUTH ISLAND: Abundant throughout in mountain districts. Ascends to 4000 ft. December–January.

6. *R. subsericea*, *Hook. f. Fl. Nov. Zel.* i. 136.—Stouter than *R. glabra*, and more closely branched, forming smaller and more compact patches with shorter erect branches. Leaves rather longer and broader than in *R. glabra*, closely imbricated, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, linear-oblong, obtuse or subacute, flat or nearly so, usually sparingly clothed with thin silvery tomentum or rarely almost glabrous. Heads rather larger, $\frac{1}{3}$ in. diam.; involucre bracts broader, the innermost with larger and more conspicuous white radiating tips. Florets similar to those of *R. glabra*, but fewer in number. Achene glabrous. Pappus-hairs copious, soft, slightly thickened at the tips.—*Handb. N.Z. Fl.* 150; *Kirk, Students' Fl.* 303.

SOUTH ISLAND: Abundant in mountain districts throughout. 1000–4500 ft. December–January.

Very closely allied to *R. glabra*, but generally recognised without difficulty by the more compact habit, silky leaves, rather larger heads with more conspicuous white tips to the inner involucre bracts, and by the pappus-hairs being slightly thickened above.

7. *R. Parkii*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 355, t. 34, f. 3.—Stems 1–6 in. long, prostrate, creeping and rooting, often densely matted and forming large patches; branches short, erect or ascending, $\frac{1}{2}$ –1 in. long. Leaves closely imbricated, spreading and recurved, $\frac{1}{10}$ – $\frac{1}{6}$ in. long, obovate-spathulate, obtuse, clothed with white or buff woolly appressed tomentum except towards the base, which is usually glabrous. Heads $\frac{1}{6}$ – $\frac{1}{4}$ in. diam., sessile among the terminal leaves; involucre bracts in 2–3 series; the outer short, tomentose on the outside; the inner longer, linear-oblong, obtuse, with white radiating tips. Florets 15–25, the females about equal to the hermaphrodite ones in number. Achene puberulous. Pappus-hairs slightly thickened at the tips.

SOUTH ISLAND: Canterbury — Mount Dobson, Lake Tekapo, Mount Ollivier, T. F. C. Otago—Mount Alta, *Buchanan!* Lake Wanaka, Hector Mountains, Old Man Range, Ida Valley, and elsewhere in Central Otago, *Petrie!* 2500–5500 ft. December–January.

Mr. Petrie's specimens and my own agree with Mr. Buchanan's figure, and exactly match a specimen which he gave me from Mount Alta, the original locality. In Mr. Kirk's herbarium it is placed under *Helichrysum Youngii*; but that species differs widely in the larger leaves clothed with softer tomentum, much larger heads with very much longer acute inner involucre bracts, and in the more numerous florets.

8. *R. subulata*, Hook. f. *Handb. N.Z. Fl.* 149.—A small densely tufted species forming moss-like patches 1–3 in. diam., perfectly glabrous in all its parts; branches $\frac{1}{3}$ –1 in. high. Leaves very closely imbricated, suberect or patent, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, subulate, acuminate, 1-nerved. Heads $\frac{1}{6}$ in. diam.; involucre bracts in 2–3 series, linear-oblong, scarious, acute, not white nor radiating. Receptacle convex, hispid. Florets 18–25, the females usually rather fewer in number than the hermaphrodite ones. Achene silky. Pappus-hairs somewhat rigid, thickened at the tips.—Kirk, *Students' Fl.* 304.

SOUTH ISLAND: Nelson—Mountains above the Wairau Gorge, Sinclair, T. F. C. Canterbury—Mountains above Arthur's Pass, T. F. C.; Rangitata Valley, Armstrong! Otago—Lake district, Hector and Buchanan! Hector Mountains, Mount Pisa, Mount Tyndall, Petrie! 4000–6500 ft. December–January.

A well-marked species, not closely related to any other.

9. *R. eximia*, Hook. f. *Handb. N.Z. Fl.* 149.—Forming large rounded or amorphous densely compacted masses from 2–3 in. to several feet long, and sometimes over 2 ft. high. Root stout, woody; branches short, with the leaves $\frac{1}{4}$ in. diam. Leaves most densely packed, imbricated all round the branch in many series, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, linear-obovate or linear-cuneate, rounded at the tip, membranous, bearing on both surfaces towards the tip a dense tuft of straight white hairs which project beyond the leaf and entirely conceal it. On the back of the leaf the hairs often extend half-way down the leaf or more, but on the upper surface the lower two-thirds is usually quite glabrous. Heads numerous, small, sunk among the leaves at the tips of the branches; involucre bracts in 2 series, narrow-linear, scarious, with a tuft of hairs above the middle, not white at the tips. Florets 8–12 or more, the hermaphrodite ones more numerous than the female. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs few, rigid, thickened at the tip.—Kirk, *Students' Fl.* 304.

SOUTH ISLAND: Nelson—Mount Peel, T. F. C. Canterbury—Mount Torlesse, Haast, Kirk! Enys! Petrie! Cockayne! T. F. C.; Mount Dobson, Haast, T. F. C.; Mount Cook district, T. F. C. Otago—Lake district, Buchanan! Mount Ida Range, Petrie! 4000–6000 ft. December–January.

A most remarkable plant. It is probably not uncommon in alpine situations all along the eastern side of the Southern Alps from Nelson to Otago, but I have only quoted those localities from whence I have seen flowering specimens. In a barren state it is very easy to confound it with *R. mammillaris*.

There are several forms closely related to *R. eximia* respecting which further information is much wanted. Mr. Townson sends a variety from Mount Frederic, near Westport, remarkable for the branches being quite flat at the tips, and so closely compacted that the tips show on the even surface of the hummock like mosaic. On the other hand, specimens collected by myself in the Mount Cook district are much less dense, the tips of the branches forming conspicuous mammillary knobs. I have seen no specimens of Mr. Kirk's var. *lata*, apparently distinguished by the broader and shorter less closely imbricate leaves. Nor are there any specimens in his herbarium of *R. Brownii*, Kirk, provisionally separated from *R. eximia* on account of the linear-oblong acute leaves.

10. **R. Hectori**, Hook. f. *Handb. N.Z. Fl.* 149.—Often forming broad dense patches. Stems prostrate, much branched, 1–3 in. long; branches $\frac{1}{2}$ –2 in. high, close-set, erect or ascending. Leaves closely imbricated, erecto-patent, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, broadly ovate, obtuse, upper half thick and coriaceous and clothed with appressed silvery tomentum, lower half membranous, glabrous, back longitudinally grooved when dry. Heads small, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam., sunk amongst the terminal leaves; involucre bracts in 2 series, linear-oblong, scarious, subacute, glabrous, not white at the tips. Florets 10–18; female 3–6. Achene glabrous or nearly so. Pappus-hairs few, rigid, thickened at the tips.—*Kirk, Students' Fl.* 304.

Var. **mollis**, Buch. ex Kirk, *Students' Fl.* 305.—Smaller and not so rigid. Leaves not so closely imbricated, broader and softer, cottony at the base, not so silvery at the tip. Heads smaller. Florets 6–10. Achenes glabrous. Perhaps a distinct species.

SOUTH ISLAND: Canterbury—Mount Dobson Range, T. F. C. Otago—Lake district, *Hector* and *Buchanan*! Mount St. Bathans, *Hector* Mountains, Mount Pisa, Ben Lomond, *Petrie*! 4000–6500 ft. December–January. Var. **mollis**: Mount St. Bathans, *Petrie*!

11. **R. grandiflora**, Hook. f. *Fl. Nov. Zel.* i. 136, t. 37A.—Stems $\frac{1}{2}$ –2 in. long, tufted, simple or branched at the base, stout, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. with the leaves, erect or curved; roots long and wiry. Leaves imbricated all round the stem, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, ovate- or lanceolate-subulate, gradually tapering to a subacute tip, rigid, striate on the back, clothed with silvery appressed tomentum, loosely cottony towards the base. Heads large, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam., sunk among the terminal leaves; involucre bracts in about 2 series; the outer few, short, scarious; inner linear, obtuse, spreading, with long white radiating tips; receptacle small, convex, hispid. Florets 25–40, about one-third female, narrow, the rest hermaphrodite. Achene silky. Pappus-hairs rather slender, thickened at the tips.—*Handb. N.Z. Fl.* 150; *Kirk, Students' Fl.* 305.

NORTH AND SOUTH ISLANDS: Frequent in mountain districts from the East Cape and Taupo to Foveaux Strait. 3000–6000 ft. December–January.

This has a different habit to any of the other species included in the genus, and would be far more appropriately placed in *Helichrysum*.

12. **R. Petriensis**, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 549. — Usually forming laxly branched patches. Stems 2–6 in. long, prostrate or suberect; branches numerous, ascending or erect, viscid, with the leaves $\frac{1}{6}$ – $\frac{1}{5}$ in. diam. Leaves laxly imbricating, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, obovate-spathulate; base erect, membranous, loosely cottony; tip spreading or recurved, rounded, coriaceous, clothed with densely felted shining tomentum. Heads $\frac{1}{4}$ in. diam., sessile among the terminal leaves; involucre bracts in 2 series, linear, scarious, obtuse, the inner with short white radiating tips. Florets 30–50; female very slender, filiform, 8–15. Achene glabrous or puberulous. Pappus-hairs thickened at the tips. — *Students' Fl.* 305.

SOUTH ISLAND: Canterbury — Mount Dobson Range, *T. F. C.* Otago — Mount Ida and Mount St. Bathans, *Petrie!* 3500–5500 ft. December–January.

A remarkably distinct species, at once recognised by the loosely tufted habit, long slender branches, spreading and recurved leaves, and numerous florets.

13. **R. mammillaris**, *Hook. f. Handb. N.Z. Fl.* 150. — Forming hard compact masses similar in size and aspect to those of *R. eximia*. Branches short, stout, with the leaves quite $\frac{1}{4}$ in. diam. Leaves most densely packed, imbricated all round the branches in many series, spreading, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, obovate-cuneate or spathulate, rounded or almost truncate at the tip, membranous, glabrous or nearly so in the lower half, in the upper half clothed on both surfaces with a dense tuft of straight hairs which project just beyond the tip and conceal the leaf. Heads $\frac{1}{8}$ – $\frac{1}{4}$ in. diam., sunk among the leaves at the tips of the branches; involucre bracts in about 2 series, the inner linear-oblong, scarious, with conspicuous white obtuse or subacute radiating tips. Florets 10–12, the hermaphrodite ones more numerous than the females. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs few, rigid, thickened at the tips. — *Kirk, Students' Fl.* 306.

SOUTH ISLAND: Nelson — Mount Starveall, *Bryant* ("Students' Flora"). Canterbury — Mount Torlesse, *Haast* (Handbook). Otago — Alps of the Lake district, *Buchanan!* 4000–6000 ft. *Vegetable sheep.*

The conspicuous white radiating tips to the inner involucre bracts distinguish this at a glance from *R. eximia*, but in the absence of flowers it is by no means easy to separate the two species. The leaves of *R. mammillaris*, however, are shorter and broader, with shorter hairs which do not project so far beyond the tip of the leaf as in *R. eximia*. The only specimens I have seen are Mr. Buchanan's, which are in full flower, and unmistakable. The Mount Starveall locality is given on the authority of Mr. Kirk, but there are no specimens from thence in his herbarium.

14. **R. rubra**, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 350, t. 30, f. 2. — Forming hard compact masses 6–12 in. diam. and 4–8 in. high; branches with the leaves $\frac{1}{6}$ – $\frac{1}{5}$ in. diam. Leaves closely

packed, imbricated in many series, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, broadly obovate-spathulate or cuneate, rounded or almost truncate at the tip, membranous, upper part clothed on both surfaces with long straight hairs which project beyond the leaf, but the extreme tip naked on both sides though concealed by the hairs, lower portion of the leaf glabrous on both surfaces. Heads small, $\frac{1}{10}$ in. diam., sunk among the terminal leaves; involucral bracts numerous, linear, obtuse, glabrous, the inner with short white radiating tips. Florets 10–14; corolla dark-crimson. Achene clothed with long silky hairs. Pappus-hairs few, rigid, thickened at the tips.—*Kirk, Students' Fl.* 305.

NORTH ISLAND: Mount Holdsworth, Tararua Range, alt. 4500 ft., *Buchanan!* *T. P. Arnold!* January.

I have only seen very imperfect specimens of this, and the above description is mainly founded on that originally published by Buchanan. Its nearest ally appears to be *R. mammillaris*.

15. **R. Buchanani**, *T. Kirk, Students' Fl.* 307.—Apparently forming hard compact masses. Branches short, stout, with the leaves on $\frac{1}{4}$ in. diam. Leaves closely packed, imbricated in several series, $\frac{1}{8}$ – $\frac{1}{6}$ in. long and almost as broad at the tip, broadly cuneate, truncate, membranous; upper surface with the lower two-thirds quite glabrous, above that clothed with straight hairs which project just beyond the tip, forming a kind of fringe; under-surface with the lower half loosely cottony, the upper half glabrous, more or less corrugated or wrinkled. Heads unknown.

SOUTH ISLAND: Otago—Mount Alta, *Buchanan!*

A very remarkable plant, the exact position of which must remain doubtful until the flowers have been observed. It is probably nearest to *P. Goyeni*. The leaves differ from those of any other species in the broad truncate tips densely hairy above, but glabrous and wrinkled beneath.

16. **R. Goyeni**, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 373.—Forming hard compact greenish masses from a few inches to 2 or 3 ft. long, but rarely more than 6 or 8 in. high. Branches very short, closely compacted and often subangular from mutual pressure, with the leaves $\frac{1}{2}$ – $\frac{1}{4}$ in. diam. Leaves very closely packed, densely imbricated in many series, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, linear-oblong, sessile by a broad base, rather wider and truncate at the tip, glabrous beneath, on the upper surface bearing near the tip a dense tuft of straight white hairs slightly longer than the leaf, the extreme upper margin naked although concealed by the hairs. Heads small, deeply sunk among the leaves at the tips of the branches; involucral bracts in 2 series; the outer linear-spathulate, scarious, bearing a tuft of hairs at the tip; the inner linear, scarious, obtuse, some of them with short hardly radiating white tips. Florets few. Achene hispid, with a thickened areole. Pappus-hairs few, thickened upwards.—*Students' Fl.* 306.

STEWART ISLAND: Rakiahua, *P. Goyen!* Kirk! Smith's Lookout and Mount Anglem, *Kirk!* 1000-3300 ft.

17. *R. bryoides*, *Hook. f. Fl. Nov. Zel.* ii. 332.—Forming hard and dense convex patches 2-8 in. diam. Lower portion of the stem hard and woody, roots long and stringy. Branches short, stout, with the leaves $\frac{1}{8}$ - $\frac{1}{4}$ in. diam. Leaves very closely packed, imbricated in several series all round the branch, erecto-patent, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, narrow obovate-spathulate or rhomboid-spathulate, subacute or obtuse; lower two-thirds glabrous or slightly woolly, upper one-third about triangular, coriaceous, clothed on both surfaces with closely felted silky hairs which do not conceal the shape of the leaf, and with a tuft of cottony wool on each side. Heads $\frac{1}{8}$ - $\frac{1}{4}$ in. diam., sunk among the terminal leaves; involucre bracts in 2-3 series, linear-oblong, scarious, acute, inner with white radiating tips. Florets 8-14, the hermaphrodite ones more numerous than the females. Achene with long silky hairs and a thickened areole at the base. Pappus-hairs few, rigid, thickened at the tips.—*Handb. N.Z. Fl.* 150; *Kirk, Students' Fl.* 307.

SOUTH ISLAND: Common on the mountains of Nelson and Marlborough. Canterbury—Mount Torlesse, *Cockayne!* Black Range, *T. F. C.*; Craigieburn Mountains, *Petrie!* Otago—Mount Pisa and the Hector Mountains, *Petrie!* 3500-6500 ft. December-January.

Easily distinguished from *R. eximia*, *R. mammillaris*, &c., by the hairs on the leaves not enveloping them so as to conceal their shape.

11. *HELICHRYSUM*, Vail.

Herbs or small shrubs, very variable in habit, often woolly or tomentose. Leaves alternate or the lower rarely opposite, quite entire. Heads solitary or corymbose, heterogamous and discoid or homogamous through the suppression of the female florets. Involucre from cylindrical to broadly hemispherical; bracts in several series, with or without white or coloured spreading petal-like scarious tips. Receptacle flat or convex, naked or pitted. Female florets exterior, few, sometimes altogether wanting, filiform, minutely 2-3-toothed. Disc-florets hermaphrodite, numerous, tubular with a funnel-shaped 5-toothed mouth. Anthers sagittate at the base, produced into fine tails. Style-branches of the disc-florets almost terete, truncate or subcapitate. Achenes small, terete, 5-angled or compressed. Pappus-hairs in one series (rarely in several series), free or connate below, simple or barbellate or plumose above.

A very large and heteromorphous genus, found in most parts of the world, and especially plentiful in South Africa and Australia. It has been united with *Gnaphalium* by many authors, but can usually be distinguished by the hermaphrodite florets being always much more numerous than the female ones. All the New Zealand species are endemic.

A. *Xerochlæna*. Herbs. Involucre broad, hemispherical, the outer bracts broad, sessile, passing gradually into the inner ones, which have linear claws and white (or coloured) radiating tips. (The white tips are wanting in *H. filicaule* and *H. Loganii*.)

- | | |
|---|-----------------------------|
| Stems 6-18 in., slender, prostrate. Leaves glabrous above. | |
| Heads solitary, large, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. | 1. <i>H. bellidioides</i> . |
| Stems 12-24 in., slender, prostrate. Leaves glabrous above. | |
| Heads corymbose, $\frac{1}{2}$ in. diam. | 2. <i>H. Purdiei</i> . |
| Stems 3-10 in., filiform, erect. Leaves glabrous above. | |
| Heads solitary, $\frac{1}{4}$ - $\frac{1}{3}$ in.; involucre bracts without white radiating tips | 3. <i>H. filicaule</i> . |
| Stems 2-4 in., tufted, ascending. Leaves woolly on both surfaces. Heads corymbose, $\frac{1}{4}$ in. diam. | 4. <i>H. Sinclairii</i> . |
| Small, densely matted, $\frac{1}{2}$ -1½ in. high. Leaves closely imbricate, woolly on both surfaces. Heads solitary, large, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. | 5. <i>H. Youngii</i> . |
| Small, densely tufted, 1-2 in. Leaves closely imbricate, white and silvery on both surfaces. Heads fascicled, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. | 6. <i>H. fasciculatum</i> . |
| Small, forming compact patches. Leaves densely imbricate, tips clothed with long straight hairs. Heads sunk among the terminal leaves; involucre bracts not white and radiating | 7. <i>H. Loganii</i> . |

B. *Leontopodioides*. Herbs. Heads small, in dense terminal cymes subtended by broad spreading floral leaves.

- | | |
|--|---------------------------|
| Leaves $\frac{1}{3}$ - $\frac{1}{2}$ in., linear-oblong, tips erect | 8. <i>H. Leontopodium</i> |
| Leaves $\frac{1}{4}$ - $\frac{1}{3}$ in., oblong-spathulate, tips recurved | 9. <i>H. grandiceps</i> . |

C. *Ozothamnus*. Shrubs, often of small size. Heads small, cymose or solitary. Involucre bracts not white or radiating, or very obscurely so.

* Heads in corymbose cymes.

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| Leaves ovate or orbicular, petiolate | 10. <i>H. glomeratum</i> . |
| Leaves lanceolate, petiolate | 11. <i>H. lanceolatum</i> . |

** Heads solitary. Leaves densely imbricate, closely appressed to the branch.

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| Branchlets slender. Leaves in about 6 series, $\frac{1}{12}$ - $\frac{1}{10}$ in., linear, silky or hoary | 12. <i>H. depressum</i> . |
| Branchlets $\frac{1}{12}$ - $\frac{1}{8}$ in. Leaves in about 4 series, $\frac{1}{16}$ - $\frac{1}{12}$ in. polished and keeled on the back | 13. <i>H. microphyllum</i> |
| Branchlets $\frac{1}{8}$ - $\frac{1}{6}$ in. Leaves in about 6 series, $\frac{1}{10}$ - $\frac{1}{6}$ in., polished and keeled on the back | 14. <i>H. Selago</i> . |
| Branchlets stout, $\frac{1}{3}$ in. Leaves in many series, $\frac{1}{8}$ - $\frac{1}{4}$ in., polished and convex on the back | 15. <i>H. coralloides</i> . |

*** Heads solitary. Leaves closely imbricate, tips spreading and recurved.

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| Leaves in several series, $\frac{1}{8}$ in., oblong, silvery on both surfaces | 16. <i>H. pauciflorum</i> . |
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1. *H. bellidioides*, Willd. *Sp. Plant.* iii. 1911.—Stems slender, prostrate, much branched, almost woody at the base, 6-18 in. long; branches numerous, erect or ascending, leafy. Leaves loosely imbricate or almost distant, spreading or recurved, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, obovate-spathulate or obovate-oblong, obtuse or apiculate, flat,

1-nerved, upper surface slightly cottony or glabrous, beneath clothed with cottony appressed tomentum. Heads solitary, $\frac{1}{2}$ in. diam. or more, on bracteate cottony peduncles 1–5 in. long terminating the branches; involucral bracts in many series, linear-ligulate, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, with scarious tomentose claws and long white radiating tips. Receptacle convex or almost conical. Florets very numerous; females few, in 1 or 2 series. Achene glabrous, with a thickened areole at the base. Pappus-hairs few, slender.—*A. Cunn. Precur.* n. 449; *Raoul, Choix*, 45; *Kirk, Students' Fl.* 308. *Gnaphalium bellidioides*, *Hook. f. Fl. Nov. Zel.* i. 137; *Handb. N.Z. Fl.* 152. *Xeranthemum bellidioides*, *Forst. Prodr.* n. 293; *A. Rich. Fl. Nouv. Zel.* 242.

Var. **prostratum**, *Kirk, Students' Fl.* 309.—Similar to the type, but heads sessile at the tips of the branches.—*H. prostratum*, *Hook. f. Fl. Antarct.* i. 30, t. 21. *Gnaphalium prostratum*, *Hook. f. Fl. Nov. Zel.* i. 137; *Handb. N.Z. Fl.* 152.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant in mountain districts from the East Cape and Taupo southwards. Sea-level to 5000 ft. November–February. Var. *prostratum*: Sparingly found in both North and South Islands, more abundant in the Auckland and Campbell Islands.

A common plant. I quite agree with Mr. Kirk in considering *H. prostratum* to be a variety only, and there is no difficulty in collecting passage-forms from no peduncles to very long bracteate ones. But I do not find the conical receptacle to be peculiar to var. *prostratum*.

2. **H. Purdiei**, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 440.—Stems slender, wiry, prostrate, spreading, much branched, woody at the base, 1–2 ft. long; branches white and tomentose at the tips. Leaves distant, spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, obovate-spathulate, rounded at the tip and minutely apiculate, flat, rather membranous, pubescent or almost glabrous above, beneath clothed with laxly appressed greyish-white tomentum. Heads $\frac{1}{4}$ in. diam., in corymbs of 3 to 6 terminating the branchlets; peduncles and pedicels short, slender, tomentose. Involucral bracts in several series; the outer very short, obtuse, brown and scarious; the inner linear-oblong with short white radiating tips. Florets very numerous; females few, in 1–2 series. Achene glabrous, with a thickened areole at the base. Pappus-hairs few, slender, barbellate above.—*Kirk, Students' Fl.* 309.

SOUTH ISLAND: Otago—Dunedin Harbour, rare, *A. C. Purdie!* *Petrie!* *Aston!* November–December.

3. **H. filicaule**, *Hook. f. Fl. Nov. Zel.* i. 140, t. 36B.—Rhizome long, wiry, creeping, putting up numerous very slender simple or rarely branched erect cottony stems 3–10 in. high. Leaves distant, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, obovate-oblong or narrow-oblong, obtuse or apiculate, glabrous or slightly cottony above, beneath clothed with white cottony tomentum. Heads solitary, terminal on long filiform

peduncles, $\frac{1}{3}$ in. diam.; involucre bracts in about 4 series; the outer shorter, oblong, obtuse, cottony at the base; inner longer, linear-oblong or linear, acute, scarious. Receptacle small, convex. Florets numerous; females few, in 1 series. Achene obscurely papillose or puberulous. Pappus-hairs very slender. — *Kirk, Students' Flora*, 309. *Gnaphalium flicaule*, *Hook. f. Handb. N.Z. Fl.* 153.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND: Not uncommon in dry grassy places from Rotorua southwards. Sea-level to 4000 ft. December–February.

4. *H. Sinclairii*, *Hook. f. Handb. N.Z. Fl.* 153. — “A small subalpine species; stems and branches ascending, leafy, 2–4 in. high. Leaves close-set, spreading, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, $\frac{1}{6}$ in. broad, linear-oblong or obovate-spathulate, obtuse, densely covered with pale cottony tomentum on both surfaces. Heads $\frac{1}{4}$ in. diam., in numerous rounded terminal dense corymbs $\frac{1}{2}$ –1 in. across; peduncles and pedicels short, densely cottony; outer scales of involucre cottony, inner shortly radiating; female florets in 1 series; pappus of few stout hairs, thickened towards the tip. Achene glabrous.” — *Kirk, Students' Fl.* 309.

SOUTH ISLAND: Marlborough — Upper Awatere Valley, *Sinclair* (Handbook).

This has not been observed since its first discovery, nearly fifty years ago. Not having seen specimens, I have reproduced Hooker's description. He compares it with the Tasmanian *Raoulia catipes* (*Hook. f. Fl. Tasm.* i. 206, t. 58), but states that the leaves are smaller, the heads not half the size, and much more numerous.

5. *H. Youngii*, *Handb. N.Z. Fl.* 152. — Densely tufted, forming broad soft patches $\frac{3}{4}$ –1½ in. high; branches stout, erect, with the leaves $\frac{1}{3}$ in. diam. Leaves densely imbricate, erecto-patent or spreading, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, obovate-oblong, obtuse, sessile by a broad base, densely clothed on both surfaces with soft white or buff cottony tomentum. Heads $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., sessile amongst the terminal leaves; involucre bracts in about 3 series; the outer shorter, woolly and tomentose at the base; the inner longer, linear-oblong, acute, with white radiating tips almost equalling the scarious claw, and much exceeding the florets. Florets numerous, 50–70; about 20–30 females, in 2 series. Achene pubescent. Pappus-hairs few, rigid, brittle, slightly thickened above. — *Kirk, Students' Fl.* 310.

SOUTH ISLAND: Canterbury — Mount Torlesse and Mount Cook, *Haast!* *T. F. C.* Otago — Lake Hawea, *Haast!* Lake Wanaka, *Buchanan!* Mount Pisa, Mount Cardrona, Hector Mountains, *Petrie!* 4500–6500 ft. January.

This differs from *Helichrysum* in habit and in the numerous female florets, and would perhaps be more appropriately placed in *Raoulia*, of which it has the pappus-hairs of the section *Imbricaria*. In Mr. Kirk's herbarium it is mixed with *Raoulia Parkii*, the distinguishing characters of which have already been pointed out under the genus *Raoulia*.

6. *H. fasciculatum*, *Buch. in Trans. N.Z. Inst.* ix. (1877) 529, t. 19.—Densely tufted, much branched below, forming small patches 1–2 in. high; branches with the leaves $\frac{1}{2}$ in. diam. or more. Leaves closely imbricated, erect or spreading at the tips, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong-lanceolate or narrow obovate-lanceolate, acute, narrowed towards the base, clothed on both surfaces with white silvery tomentum, which becomes loose and cottony towards the base, grooved beneath. Heads in fascicles of 2–4 at the tips of the branches, sessile, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; involucral bracts in 3 series, scarious, linear-oblong, obtuse, tomentose on the back, the inner with white radiating tips. Receptacle narrow, hispid. Florets 12–20; female few, in 1 series. Achene silky, with a thickened areole at the base. Pappus-hairs few, slightly thickened above.—*Kirk, Students' Fl.* 310.

NORTH ISLAND: Tararua Mountains, *H. H. Travers!* SOUTH ISLAND: Nelson—Mount Starveall, *Bryant* ("Students' Flora"). 4000–5000 ft. December–January.

I have seen very imperfect specimens of this, which is evidently a very distinct species. The silvery foliage is much like that of *Raoulia grandiflora*.

7. *H. Loganii*, *T. Kirk, Students' Fl.* 310. — "Forming pulvinate masses 6–12 in. diam. Branches slender, woody at the base, with the leaves $\frac{1}{3}$ – $\frac{3}{8}$ in. diam., the whole plant clothed with soft white or greenish-white wool. Leaves densely imbricating, $\frac{1}{4}$ in. long, obovate or obovate-oblong, rounded at the tip or sub-acute, membranous, 3-nerved, tips recurved, clothed with long soft hairs, which are restricted to a dense tuft above projecting beyond the margin. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; involucral bracts in 3 series, oblong, mostly obtuse, the outer villous, the inner broader, glabrate, scarious, pale, not radiating. Achene compressed, covered with long silky hairs. Pappus-hairs barbellate, irregularly thickened towards the apex."—*Haastia Loganii*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 350, t. 30, f. 3.

SOUTH ISLAND: Mount Holdsworth, Tararua Range, *Buchanan!* *T. P. Arnold!* 4000–5000 ft.

The above description is Mr. Kirk's. I much regret that I have had no opportunity of examining good specimens, particularly as an old and very imperfect fragment in Mr. Buchanan's herbarium seems to show that the heads are fascicled, and not solitary, as might be supposed from the original description and plate.

8. *H. Leontopodium*, *Hook. f. Fl. Nov. Zel.* i. 141, t. 37B.—Stems much branched, decumbent and woody at the base, erect or ascending at the tips, 2–8 in. high. Leaves densely imbricate, erect or rarely patent, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, linear-oblong or oblong-lanceolate, acute, clothed on both surfaces with appressed shining silvery tomentum, striate when dry. Peduncles stout, terminating the branches, more or less densely clothed with imbricating bracts.

Heads 8-15 together, congested into a dense bracteate glomerule $\frac{1}{2}$ -1 in. diam.; each head about $\frac{1}{8}$ in. across; bracts 10-20, spreading, $\frac{1}{4}$ - $\frac{3}{4}$ in. long, oblong or ovate-oblong, obtuse or subacute, most densely woolly. Involucral bracts in 2 series, linear-lanceolate, woolly on the back, erect, scarious, shining. Florets numerous; females few, in 1 series. Achene silky. Pappus-hairs few, stout, scabrid, slightly thickened above.—*Kirk, Students' Fl.* 313. *Gnaphalium Colensoi*, *Hook. f. Handb. N.Z. Fl.* 154.

NORTH ISLAND: Mount Hikurangi (East Cape), *Colenso*! *Adams* and *Petrie*! Ruahine Mountains, *Colenso*! *Petrie*! Hill! Tongariro, Hill! Taranaki Range, *H. H. Travers*! *Budden*. SOUTH ISLAND: Nelson—Raglan Range and mountains above the Wairau Gorge, *T. F. C.*; Tarndale, *Sinclair*; mountains above the Rainbow River, *Bryant*. 4000-6000 ft. January-February.

A beautiful little plant, with precisely the aspect of the edelweiss of the European Alps (*Leontopodium alpinum*), but with flower-heads of different structure.

9. **H. grandiceps**, *Hook. f. Handb. N.Z. Fl.* 154.—Densely tufted. Stems much branched, decumbent and woody at the base, 2-8 in. high; branches ascending or erect. Leaves densely imbricate, spreading or recurved, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, oblong- or obovate-spathulate, obtuse, flat or concave, clothed on both surfaces with appressed silvery tomentum. Peduncles composed of the elongated tips of the branches, leafy throughout, but the leaves usually not so closely imbricate. Heads congested into a terminal bracteate glomerule surrounded by leafy bracts, as in *H. Leontopodium*, but bracts rather shorter and broader. Involucral bracts in 2 series, linear, tomentose on the back, with brown scarious tips. Florets numerous; females few, in 1 series. Achene silky. Pappus-hairs few, rather stout, thickened above.—*Kirk, Students' Fl.* 313.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to Otago. 2500-5000 ft. December-January.

Allied to *H. Leontopodium*, but amply distinct in the shorter and broader usually recurved leaves, more densely leafy peduncles, shorter and broader bracts, and smaller glomerules.

10. **H. glomeratum**, *Benth. and Hook. f. Gen. Plant.* ii. 311.—A much-branched shrub 3-8 ft. high; branches spreading, slender, flexuous, grooved, tomentose above. Leaves alternate, very variable in size, $\frac{1}{4}$ -1 $\frac{1}{2}$ in. long, orbicular or broadly ovate or ovate-spathulate, obtuse or minutely apiculate, suddenly narrowed into a short slender petiole, quite entire, flat; upper surface glabrous, minutely reticulate; beneath clothed with white cottony tomentum. Heads in terminal or lateral sessile or stalked subglobose corymbs, small, $\frac{1}{10}$ in. diam. Involucral bracts few, in about 3 series, oblong, obtuse, scarious, woolly at the base. Florets 8-12, 2 or 3 of them female. Achene puberulous, with a thickened

areole at the base. Pappus-hairs thickened at the tips.—*Kirk, Students' Fl.* 311. *Ozothamnus glomeratus*, *Hook. f. Fl. Nov. Zel.* i. 133; *Handb. N.Z. Fl.* 146. *Swammerdamia glomerata*, *Raoul, Choix*, 20, t. 16.

NORTH AND SOUTH ISLANDS : Not uncommon from the North Cape southwards. Sea-level to 2500 ft. November–January.

11. *H. lanceolatum*, *T. Kirk, Students' Fl.* 311.—Altogether similar to *H. glomeratum*, but leaves 1–1½ in. long, lanceolate or elliptic-lanceolate, acute or subacute, narrowed into a short winged petiole, glabrous above, beneath clothed with white appressed tomentum; margins flat or slightly undulate. Heads, florets, and achenes precisely as in *H. glomeratum*.—*Ozothamnus lanceolatus*, *Buch. in Trans. N.Z. Inst.* ii. (1870) 88.

NORTH ISLAND : Mountains near Hokianga, *Buchanan!* alt. 2000 ft.

Probably only a narrow-leaved variety of the preceding. I have seen no specimens except Mr. Buchanan's.

12. *H. depressum*, *Benth. and Hook. f. Gen. Plant.* ii. 311.—A suberect or rarely prostrate much-branched bush 1–5 ft. high, hoary in all its parts with appressed greyish-white tomentum; branches spreading, rigid and wiry, often tortuous. Leaves minute, closely appressed to the branch, laxly imbricating, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, linear, obtuse, concave and loosely woolly on the inner face, silky or woolly on the back. Heads small, $\frac{1}{8}$ in. diam., solitary, sessile at the tips of the branchlets; involucre bracts few, linear, scarious, acute or acuminate, rarely obtuse, glabrate or cottony at the base. Florets 8–12; females few, 2–3. Achene glabrous or puberulous. Pappus-hairs in several series, copious, slender.—*Kirk, Students' Fl.* 311. *Ozothamnus depressus*, *Hook. f. Fl. Nov. Zel.* i. 134, t. 35B; *Handb. N.Z. Fl.* 146.

NORTH ISLAND : Hawke's Bay—Tukituki River, *Petrie!* SOUTH ISLAND : Not uncommon throughout, usually on shingly river-beds. 1000–4000 ft. December–February.

13. *H. microphyllum*, *Benth. and Hook. f. Gen. Plant.* ii. 311.—A small depressed much-branched shrub 6–15 in. high; branchlets slender, crowded, tomentose, with the leaves $\frac{1}{12}$ – $\frac{1}{8}$ in. diam. Leaves minute, closely appressed to the branch, densely and almost quadrifariouly imbricating, $\frac{1}{16}$ – $\frac{1}{12}$ in. long, ovate or triangular, obtuse, thick and coriaceous, concave and densely woolly on the inner face, green and polished and obscurely keeled on the back. Heads terminal, solitary, sessile, turbinate, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam.; involucre bracts in about 3 series, linear-oblong, obtuse, scarious. Florets 20–25; female few, in 1 series. Achene pubescent. Pappus-hairs few, not thickened at the tip.—*Kirk, Students' Fl.* 312. *Ozothamnus microphyllus*, *Hook. f. Fl. Nov. Zel.* i. 134, t. 35A; *Handb. N.Z. Fl.* 146.

SOUTH ISLAND: Not uncommon in mountain districts throughout. 1500-4000 ft. January-March.

The usual state of this can be recognised by the slender branches and minute almost quadrifuriously arranged leaves, but stouter specimens are difficult to separate from the next species.

14. *H. Selago*, *Benth. and Hook. f. Gen. Plant.* ii. 311.—A small much-branched shrub 6-15 in. high; branchlets stout, crowded, with the leaves $\frac{1}{8}$ – $\frac{1}{6}$ in. diam. Leaves minute, closely appressed to the branch, densely imbricating in about 5 or 6 series, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, ovate-triangular, obtuse or subacute, thick and coriaceous in the upper part, membranous below, concave and woolly on the inner face, polished and obtusely keeled on the back. Heads terminal, solitary, sessile, $\frac{1}{4}$ in. diam.; involucral bracts in 3 series, linear-oblong; the outer obtuse, tomentose at the base; the inner subacute, coriaceous below, with short scarious spreading tips. Florets 35-45; females few, in 1 series. Achene puberulous. Pappus-hairs few, not thickened at the tips.—*Kirk, Students' Fl.* 312. *Ozothamnus Selago*, *Hook. f. Fl. Nov. Zel.* ii. 332; *Handb. N.Z. Fl.* 147.

Var. *tomentosum*.—Leaves oblong, subacute, almost concealed by fulvous woolly tomentum. Heads not seen. Perhaps a distinct species.

SOUTH ISLAND: Nelson—Wairau Gorge, *T. F. C.*; Clarence Valley, *Kirk!* *T. F. C.* Marlborough—Kaikoura Mountains, *Monro, Buchanan!* Awatere Valley, *Kirk.* Canterbury—Mount Torlesse, *Carrington*; Rangitata, *Armstrong.* Var. *tomentosum*: Mount Dobson, *T. F. C.* 2000-4500 ft. December-January.

Very closely allied to *H. microphyllum*, and only to be distinguished by the stouter branches, 6-ranked leaves, larger heads, and more numerous florets. Intermediates which might almost be referred to either species are not infrequently seen.

15. *H. coralloides*, *Benth. and Hook. f. Gen. Plant.* ii. 311.—A short stout much-branched shrub 4-12 in. high, hard and woody below; branches spreading, cylindrical, $\frac{1}{3}$ in. diam., densely tomentose between the leaves, which resemble tubercles on their surface. Leaves closely appressed to the branch, imbricated in many series, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, oblong, obtuse, very thick and coriaceous towards the tip, membranous below, inner face concave and densely clothed with long woolly tomentum, back convex or obscurely keeled, glabrous and polished. Heads $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., terminal, solitary, sunk amongst the uppermost leaves; involucral bracts in about 3 series, linear-oblong, rigid and cartilaginous at the base; tips thinner, scarious, often recurved. Florets numerous; female few, in one series. Achene pubescent. Pappus-hairs few, stout, slightly thickened above.—*Kirk, Students' Fl.* 312. *Ozothamnus coralloides*, *Hook. f. Fl. Nov. Zel.* ii. 332; *Handb. N.Z. Fl.* 147.

SOUTH ISLAND: Marlborough—Kaikoura Mountains, *Monro*, *Buchanan*!
Upper Awatere, *Sinclair*! Medway Creek, *Kirk*! Palmer River, *Cockayne*!
Nelson—Western slopes of Mount Percival, *T. F. C.* 3000–5000 ft.

A most remarkable plant.

16. *H. pauciflorum*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 351.—A small much-branched greyish-white plant, with a hard and woody base. Stems 3–8 in. high, decumbent below, erect or ascending at the tips; branches stout, with the leaves $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Leaves densely imbricate in several series, $\frac{1}{8}$ in. long, oblong or oblong-spathulate, obtuse or subacute, erect or spreading at the tips, sessile by a broad base, both surfaces densely clothed with greyish-white tomentum. Heads $\frac{1}{8}$ in. diam., solitary, sessile at the tips of the branches and almost hidden by the leaves; involucre bracts in 2 series, lanceolate, acute, scarious, silky at the base on the outside. Florets few, 10–16, of which 3–6 are females. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs few, thickened upwards.—*Students' Fl.* 313.

SOUTH ISLAND: Canterbury—Craigieburn Mountains, *Cockayne*! *Petrie*!
Candlestick Mountains, *Cockayne*! 3000–5000 ft.

A curious species, with a close superficial resemblance in habit and foliage to *H. grandiceps*, but with an altogether different inflorescence.

12. *CASSINIA*, R. Br.

Shrubs or very rarely herbs. Leaves alternate, entire. Heads small, numerous, in terminal corymbs or panicles, discoid, homogamous in most of the species, but usually heterogamous in those found in New Zealand. Involucre oblong or ovoid; bracts in several series, imbricate, scarious; the inner with short white radiating tips. Receptacle narrow, with scarious chaffy scales among the florets. Florets few, in the majority of the species all hermaphrodite, tubular, 5-toothed; but in the New Zealand species 1 or 2 of the outer ones are female, filiform, minutely toothed. Anthers sagittate at the base, usually produced into slender tails. Style-branches of the hermaphrodite florets terete, truncate. Achenes small, angled or almost terete. Pappus-hairs in 1 series, slender, free or connate at the base.

A small genus of about 20 species, confined to Australia, New Zealand, and South Africa. The New Zealand species are all endemic, and with 1 or 2 from South Africa constitute the subgenus *Rhynea*, characterized by the inner involucre bracts having short white radiating tips, and by the heads usually having 1 or 2 female florets. The species are very closely allied, and are by no means easy to discriminate.

* Receptacle with numerous scales among the florets.

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| Leaves $\frac{1}{8}$ – $\frac{1}{2}$ in., linear-obovate, white beneath | 1. <i>C. retorta</i> . |
| Leaves $\frac{1}{2}$ – $\frac{1}{2}$ in., linear or linear-spathulate, white or yellowish beneath | 2. <i>C. leptophylla</i> . |
| Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., linear-obovate or linear-oblong, glutinous, fulvous or whitish beneath | 3. <i>C. Vanuilliersii</i> . |

** Receptacle with few or no scales among the florets.

Leaves $\frac{1}{8}$ – $\frac{2}{3}$ in., linear-spathulate, white beneath	..	4. <i>C. amœna</i> .
Leaves $\frac{1}{8}$ – $\frac{1}{3}$ in., linear or narrow linear-spathulate, glutinous, fulvous beneath	.. .. .	5. <i>C. fulvida</i> .

1. *C. retorta*, *A. Cunn. ex D.C. Prodr.* vi. 154.—A much or sparingly branched heath-like shrub 4–15 ft. high; branches stout, spreading, clothed with white tomentum. Leaves numerous, small, crowded, spreading and recurved, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, linear-obovate or linear-oblong or oblong-obovate, obtuse, narrowed into a very short petiole, coriaceous, glabrous or hoary above, beneath clothed with dense white tomentum; margins recurved. Heads numerous, in small terminal corymbs, shortly pedicelled, turbinate, $\frac{1}{4}$ in. long; involucre bracts in several series; the outer shorter, ovate-oblong, tomentose; inner linear-oblong, with short white obtuse radiating tips. Receptacle with many white-tipped scales similar to the inner involucre bracts. Florets 6–20. Achenes glabrous, striate. Pappus-hairs slender.—*Hook. f. Fl. Nov. Zel.* i. 132; *Handb. N.Z. Fl.* 145; *Kirk, Students' Fl.* 314.

NORTH ISLAND: Common as far south as the East Cape, usually near the coast, on sand-dunes, &c. November–February.

2. *C. leptophylla*, *R. Br. in Trans. Linn. Soc.* xii. (1817) 120.—Much like *C. retorta* in habit and general appearance, but branches more slender. Leaves smaller, crowded, erect or spreading or recurved, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, narrow-linear or linear-spathulate, obtuse, coriaceous, glabrous above, clothed with white or yellowish tomentum beneath; margins recurved. Heads numerous, in small terminal corymbs, very shortly pedicelled, narrow-turbinate, $\frac{1}{8}$ in. long; involucre bracts in several series; the outer broader and shorter, glabrous or nearly so; inner linear, obtuse, with short white radiating tips. Receptacle with white-tipped scales subtending the florets. Florets 6–12. Achene and pappus as in *C. retorta*.—*A. Cunn. Precur.* n. 447 (in part); *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 132; *Handb. N.Z. Fl.* 145; *Kirk, Students' Fl.* 314. *C. spathulata*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 472. *Calea leptophylla*, *Forst. Prodr.* n. 287.

NORTH AND SOUTH ISLANDS: Not uncommon from the East Cape southwards to Marlborough and Nelson. *Tauhinu-korokio*; *Cottonwood*. December–February.

Very close to the preceding, but differing in the more slender habit, smaller and narrower leaves, and smaller and narrower glabrate heads. Mr. Colenso's *C. spathulata* does not seem to me to be even entitled to varietal rank.

3. *C. Vauvilliersii*, *Hook. f. Fl. Nov. Zel.* i. 133.—An erect closely branched shrub 2–6 ft. high; branches stout, erect or spreading, often glutinous, grooved, and with the leaves beneath densely clothed with fulvous or whitish tomentum. Leaves numer-

ous, close-set, erect or spreading, $\frac{1}{4}$ – $\frac{1}{3}$ in. long or more, linear-obovate or linear-oblong, obtuse, narrowed into a short broad petiole or sessile, coriaceous, glabrous and usually glutinous above, fulvous or white and strongly costate beneath; margins recurved. Heads very numerous, in terminal rounded corymbs, shortly pedicelled, turbinate, $\frac{1}{5}$ – $\frac{1}{4}$ in. long; involucre bracts in several series; the outer shorter, ovate-oblong, obtuse or subacute, tomentose or glabrate, often reddish towards the tips; inner linear-oblong, with short white obtuse radiating tips. Scales among the florets numerous. Florets 8–15. Pappus-hairs thickened at the tips.—*Handb. N.Z. Fl.* 145; *Kirk, Students' Fl.* 315. *Ozothamnus Vauvilliersii*, *Homb. et Jacq. Bot. Voy. Astrol. et Zél.* 38, t. 5; *Hook. f. Fl. Antarct.* i. 29. *Olearia xanthophylla*, *Col. in Trans. N.Z. Inst.* xx. (1888) 193.

Var. **rubra**.—Involucre bracts red, glabrous.—*C. rubra*, *Buch. in Trans. N.Z. Inst.* xix. (1887) 216; *Kirk, Students' Fl.* 315.

Var. **albida**, *Kirk, l.c.*—Branchlets and leaves beneath clothed with whitish tomentum. Leaves linear-spathulate, strongly costate beneath.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Not uncommon from the East Cape and Taupo southwards. Sea-level to 4500 ft. December–January.

A very variable plant. I am unable to maintain Buchanan's *C. rubra* as a species.

4. **C. amoena**, *Cheesem. in Trans. N.Z. Inst.* xxix. (1897) 391. —A small round-topped densely branched shrub 1–2 ft. high; branches stout, furrowed, the younger ones clothed with greyish-white tomentum. Leaves close-set, spreading or suberect, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, narrow linear-obovate or linear-spathulate, obtuse, narrowed into a short petiole, coriaceous, glabrous above, clothed with dense white tomentum beneath; margins recurved. Heads numerous, in rounded terminal corymbs, narrow turbinate, shortly pedicelled, $\frac{1}{5}$ – $\frac{1}{4}$ in. long; involucre bracts in several series; the outer shorter, ovate-oblong, obtuse, tomentose; the inner linear-oblong, with short white radiating tips. Florets few, 4–6; scales of the receptacle usually absent or rarely 1 or 2 present. Achene silky, with a thickened areole at the base. Pappus-hairs thickened at the tips. —*Kirk, Students' Fl.* 315.

NORTH ISLAND: Cliffs near the North Cape, *T. F. C.* December–January.

A pretty little plant, with much of the aspect of *C. Vauvilliersii* var. *albida*, but easily distinguished by the smaller size, narrower heads, fewer florets, and almost total absence of the receptacular scales.

5. **C. fulvida**, *Hook. f. Handb. N.Z. Fl.* 145.—A slender erect much-branched shrub 2–6 ft. high; branches glutinous, clothed with fulvous tomentum. Leaves close-set, spreading or suberect, $\frac{1}{6}$ – $\frac{1}{3}$ in.

long, linear or narrow linear-spathulate or linear-obovate, obtuse, narrowed to the base, coriaceous, glabrous and subviscid above, beneath clothed with fulvous tomentum; margins recurved. Heads very numerous, in terminal rounded corymbs, shortly pedicelled, cylindrical, $\frac{1}{5}$ in. long; involucral bracts few, in several series; outer shorter, pubescent or glabrate; inner with short white radiating tips. Scales among the florets wanting or 1 or 2 only. Florets few, 5-8. Achene pubescent. Pappus-hairs few, thickened above.—*Kirk, Students' Fl.* 316. *C. leptophylla* var. γ , *Hook. f. Fl. Nov. Zel.* i. 133.

Var. **linearis**, *Kirk, l.c.*—Leaves rather distant, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, very narrow, narrow-linear or linear-lanceolate, clothed with white tomentum beneath. Florets 4-6.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from Opotiki and Rotorua southwards. Sea-level to 3500 ft. December–February. Var. *linearis*: Near Dunedin, *Aston! H. J. Matthews!*

Very close to some forms of *C. leptophylla*, and only to be distinguished by the more fulvous viscid tomentum, fewer florets, and by the paucity or total absence of the scales among the florets.

13. CRASPEDIA, Forst.

Perennial herbs, usually more or less silky or woolly, rarely almost glabrous. Leaves radical or alternate, entire. Heads homogamous and discoid, small, numerous, sessile or nearly so, crowded together into a dense globose or ovoid glomerule or compound head, which is surrounded by scarious bracts forming a general involucre. Involucre of the partial heads of several scarious hyaline bracts, without radiating tips. Receptacle small, with hyaline scales similar to the involucral bracts at the base of each floret. Florets 3-8, all hermaphrodite, tubular with a campanulate 5-toothed limb. Anthers sagittate at the base, more or less distinctly tailed. Style-branches almost terete, truncate at the tip. Achenes small, compressed, silky. Pappus-hairs in 1 series, plumose, free or connate at the base.

A small genus of 5 or 6 species, confined to New Zealand, Australia, and Tasmania. The New Zealand species has the range of the genus.

1. **C. uniflora**, *Forst. Prodr.* n. 306.—A very variable stout or slender unbranched herb 4-20 in. high, silky, cottony or woolly, or nearly glabrous. Leaves nearly all radical, 1-8 in. long, obovate-oblong to spathulate or spathulate-lanceolate, obtuse, narrowed into a short broad petiole, usually but not always fringed with white tomentum, often slightly viscid; cauline leaves smaller and narrower, the upper reduced to distant bracts. Compound head or glomerule solitary, terminal, $\frac{1}{4}$ –2 in. diam., globose or nearly so; bracts 4-10, ovate, herbaceous with a scarious margin, shorter than the head. Partial heads 3-8-flowered; involucral bracts ob-

long or linear-oblong, thin and hyaline. Achene silky. Pappus-hairs plumose, as long as the florets.—*A. Rich. Fl. Nouv. Zel.* 245; *A. Cunn. Precur. n.* 446; *Raoul, Choix*, 45; *Kirk, Students' Fl.* 316. *C. fimbriata*, *D.C. Prodr.* vi. 152; *Hook. f. Fl. Nov. Zel.* i. 131; *Handb. N.Z. Fl.* 144. *C. Richea*, *Cass. in Dict. Sci. Nat.* xi. 353; *Benth. Fl. Austral.* iii. 579. *Stachelina fimbriata*, *Forst. ex D.C. Prodr.* vi. 153.

Var. **robusta**, *Hook. f. Fl. Nov. Zel.* i. 131.—Stout. Leaves obovate-spathulate, subacute, narrowed into a broad flat petiole, sparsely hispid or glabrate, without white cottony margins. Scape leafy. Compound head large, 1–2 in. diam.—*C. uniflora* var. *pedicellata*, *Kirk, Students' Fl.* 317.

Var. **minor**, *Hook. f. l.c.*—Small, slender, 6–12 in. high, rarely more. Leaves spathulate, membranous, glabrous or sparsely hispid, sometimes with raised viscid points, usually without white cottony margins. Compound head small, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam.—*C. viscosa*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 333.

Var. **lanata**, *Hook. f. l.c.*—Everywhere clothed with dense shaggy snow-white wool.—*C. alpina*, *Backh. in Hook. Lond. Journ. Bot.* vi. (1847) 119; *Hook. f. Handb. N.Z. Fl.* 144.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from the East Cape and Taupo southwards. Sea-level to 5000 ft. December–February.

A most variable plant. The three varieties described above look very distinct in their extreme forms, but are connected with the ordinary state of the species by numerous intermediates.

14. **SIEGESBECKIA**, Linn.

Glandular-pubescent herbs with opposite leaves. Heads rather small, in leafy panicles, heterogamous, subradiate. Involucre campanulate or hemispherical; bracts few, in about 2 rows, herbaceous, glandular-hispid; the outer spathulate, spreading; inner erect, concave, enclosing the ray-florets. Receptacle small, paleaceous; scales membranous, concave, often enclosing the florets. Ray-florets in 1 series, female, tube short, limb 2–3-fid. Disc-florets hermaphrodite, tubular with a campanulate 5-toothed mouth. Anthers entire at the base. Style-branches of the hermaphrodite florets short, flattened, usually obtuse. Achenes obovoid-oblong, not compressed, usually curved. Pappus wanting.

Species probably not more than 2, the one found in New Zealand an almost cosmopolitan weed in warm climates, the other confined to Peru.

1. **S. orientalis**, *Linn. Sp. Plant.* 900.—A sparingly branched erect annual 1–3 ft. high, with spreading opposite lower branches, more or less pubescent in all its parts. Leaves 1–4 in. long, triangular-ovate, the upper narrower and oblong-lanceolate, acuminate, cuneate at the base, petiolate, membranous, irregularly toothed or lobed or almost entire. Heads $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., yellow; outer involucre bracts usually longer than the inner, covered with gland-bearing hairs. Florets small, the rays very short. Outer achenes rough.—*Benth. Fl. Austral.* iii. 535; *Kirk, Students' Fl.* 317.

KERMADEC ISLANDS, NORTH ISLAND: In various localities as far south as the East Cape, but not common; usually near the coast. *Punawaru.* January–March.

This was treated as a naturalised plant by Hooker, but as it was collected by Banks and Solander during Cook's first voyage its nativity is unquestionable.

15. *BIDENS*, Tourn.

Annual or perennial usually erect herbs. Leaves opposite, toothed or incised or pinnately divided. Heads corymbosely panicled or subsolitary, on long peduncles, heterogamous and radiate, or homogamous and discoid. Involucre campanulate or hemispherical; bracts in about 2 series, connate at the base, the outer herbaceous, the inner membranous. Receptacle flat or convex, paleaceous. Ray-florets when present female or neuter; ligule white or yellow, spreading. Disc-florets hermaphrodite, tubular, 5-toothed. Anthers usually obtuse at the base. Style-branches of the hermaphrodite florets hairy above, with a long or short subulate point. Achene broad and compressed or slender and tetragonous, often narrowed at the tip. Pappus of 2–4 rigid retrorsely hispid bristles.

A large genus of over 100 species, widely spread in tropical regions, but most plentiful in America. The single New Zealand species is a common weed in all warm countries and many temperate ones.

1. *B. pilosa*, Linn. *Sp. Plant.* 832.—An erect glabrous or pubescent herb 1–3 ft. high; branches angular, grooved. Leaves very variable, simple or pinnate; segments 3 or 5, stalked, $\frac{3}{4}$ –2 in. long, ovate or ovate-lanceolate, acute or acuminate, serrate or rarely lobed, thin and membranous. Heads few, terminal on long slender peduncles, yellow, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; involucre bracts about $\frac{1}{4}$ in. long. Ray-florets few and short, often entirely wanting. Achenes black, slender, 4-angled, striate, crowned with 2 or 4 barbed awns.—*A. Rich. Fl. Nouv. Zel.* 235; *A. Cunn. Precur.* n. 442; *Raoul, Choix*, 45; *Hook. f. Handb. N.Z. Fl.* 138; *Benth. Fl. Austral.* iii. 543; *Kirk, Students' Fl.* 318. *B. anrantiacus*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 388.

KERMADEC ISLANDS, NORTH ISLAND: Not uncommon as far south as the East Cape. November–March.

16. *COTULA*, Tourn.

Creeping or tufted perennial or annual herbs, usually of small size, often aromatic. Leaves alternate, pinnatifid or pinnatisect, rarely entire or toothed. Heads small, peduncled, heterogamous and discoid or rarely homogamous through the suppression of the female florets, sometimes diœcious. Involucre hemispheric or campanulate; bracts in about 2 series, membranous or herbaceous; margins often scarious. Receptacle flat or convex or conical,

without scales. Female florets exterior, in 1 or 2 series, fertile; corolla broad or conic or wanting. Disc-florets hermaphrodite or often male; corolla regular, tube slender or stout and 2-winged, limb 4-toothed. Anthers obtuse at the base, entire. Style-branches of the disc-florets truncate or obtuse, sometimes undivided. Achenes compressed, sometimes winged. Pappus wanting.

A genus of 50 or 60 species, scattered widely over the world in both temperate and tropical regions. Several of the New Zealand species are difficult of discrimination, and require further study with more copious suites of specimens.

- A. *Eucotula*. *Receptacle flat or convex. Female florets without any corolla. Achenes of the female florets stipitate, in a single row.*
 Stout, glabrous, 2-10 in. high. Leaves lanceolate, $\frac{1}{2}$ -2 in., variously toothed or lobed. Heads yellow, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam. 1. *C. coronopifolia*.
- B. *Strongylosperma*. *Receptacle flat or convex. Female florets without any corolla. Achenes of the female florets in several rows.*
 Slender, diffuse, silky. Leaves pinnate or bipinnate. Heads small, $\frac{1}{10}$ - $\frac{1}{8}$ in. diam. 2. *C. australis*.
- C. *Leptinella*. *Receptacle convex or conical. Female florets in 1 or several series; corolla always present, usually inflated at the base.*

* Heads bisexual.

- Stout, fleshy. Leaves $\frac{1}{2}$ -1 in., much divided. Peduncles leafy. Heads black or dark-brown. Florets tubular or cylindric, rugose 3. *C. atrata*.
- Stout, softly woolly. Leaves 2-6 in., 3-4-pinnatisect. Heads $\frac{1}{3}$ - $\frac{1}{2}$ in. diam.; florets eglandular 4. *C. pinnosa*.
- Stout, woolly. Leaves rather fleshy, 1-3 in., pinnate or pinnatifid. Heads $\frac{1}{4}$ - $\frac{1}{3}$ in.; florets glandular 5. *C. lanata*.
- Stout, silky. Leaves 2-5 in., pinnatifid. Heads $\frac{1}{3}$ in.; florets eglandular, females in many rows 6. *C. Muellieri*.
- Slender, silky or glabrate. Leaves membranous, 1-3 in., pinnatifid. Heads $\frac{1}{3}$ in.; florets glandular, females in 1 row 7. *C. Traillii*.
- Small, silky, densely matted; stems $\frac{1}{2}$ -3 in. Leaves $\frac{1}{2}$ - $\frac{1}{3}$ in., pinnatifid. Heads almost sessile, $\frac{1}{10}$ - $\frac{1}{8}$ in. diam.; female florets in 1-2 series 8. *C. Maniototo*.
- Stems long, slender, creeping. Leaves membranous, $\frac{1}{2}$ -2 in., pinnatifid; segments broad, deeply toothed. Peduncles longer or shorter than the leaves. Heads $\frac{1}{4}$ - $\frac{1}{3}$ in. diam.; female florets numerous, in 3-4 series 9. *C. minor*.
- Stems slender, wiry. Leaves $\frac{1}{4}$ in., pinnatifid. Heads $\frac{1}{10}$ in. diam. 10. *C. filiformis*.
- Stems rather stout. Leaves pubescent, $\frac{1}{2}$ -1 $\frac{1}{2}$ in., pinnatifid; segments narrow, incised. Peduncles much longer than the leaves. Heads $\frac{1}{8}$ - $\frac{1}{4}$ in.; female florets in 3-4 series 11. *C. Haastii*.
- Stems stout, wiry. Leaves rigid, pectinately pinnatifid; segments entire. Peduncles much longer than the leaves. Heads $\frac{1}{4}$ - $\frac{1}{2}$ in.; female florets in 3-4 series 12. *C. pectinata*.
- Minute, tufted. Leaves imbricate, $\frac{1}{8}$ - $\frac{1}{3}$ in., cut straight down from the tip into 5-7 subulate lobes. Heads small, nearly sessile, $\frac{1}{8}$ in. diam. 13. *C. Goyeni*.

Stems stout, 6-12 in. long. Leaves $\frac{3}{4}$ -2 in., obovate-spathulate, crenately 3-5-toothed at the tip. Peduncles short. Heads $\frac{1}{2}$ in. diam.; female florets in many series 14. *C. Featherstonii*.

** Heads unisexual.

Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., linear-spathulate, quite entire. Peduncles 2-4 in., bracteate. Heads $\frac{1}{4}$ - $\frac{1}{2}$ in. .. 15. *C. linearifolia*.

Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., pinnatifidly cut into 5-8 linear entire segments. Peduncles 1-4 in., bracteate. Heads $\frac{1}{3}$ - $\frac{2}{3}$ in. diam. .. 16. *C. pyrethrifolia*.

Slender, wiry, silky. Leaves $\frac{1}{4}$ -1 in., silky on both surfaces, deeply pinnatifid. Peduncles short, stout, ebracteate. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in.; females the largest .. 17. *C. perpusilla*.

Slender, creeping, 4-12 in. long. Leaves membranous, 1-2 in., deeply pinnatifid, segments incised. Peduncles 1-3 in., ebracteate. Heads $\frac{1}{6}$ - $\frac{1}{3}$ in.; females the largest 18. *C. squalida*.

Stout or slender. Leaves $\frac{1}{2}$ -2 in., obovate or spathulate, crenate or lobulate, pinnatifid below. Peduncles longer or shorter than the leaves. Heads $\frac{1}{8}$ - $\frac{1}{2}$ in.; females the largest .. 19. *C. dioica*.

1. *C. coronopifolia*, Linn. *Sp. Plant.* 892.—Perfectly glabrous, smooth and succulent. Stems creeping and rooting below, ascending at the tips, branched, 2-10 in. high. Leaves scattered, dilated and clasping the stem at the base, $\frac{1}{2}$ -2 in. long, linear-lanceolate or oblong-lanceolate, coarsely toothed or lobed or pinnatifid or entire. Heads bright-yellow, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., on long slender axillary peduncles exceeding the leaves; involucre bracts linear-oblong, obtuse, membranous. Receptacle slightly convex. Female florets in 1 series, on slender flattened pedicels; corolla wanting; ovary winged, notched at the top; style short, seated in the notch. Disc-florets on much shorter pedicels, very numerous; corolla tubular, more or less dilated at the base, 4-toothed at the tip. Achenes of the female florets oblong, compressed, with a broad spongy wing; those of the disc-florets smaller, with a much narrower wing.—*Forst. Prodr.* n. 300; *A. Rich. Fl. Nouv. Zel.* 235; *A. Cunn. Precur.* n. 443; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 127; *Handb. N.Z. Fl.* 141; *Benth. Fl. Austral.* iii. 549; *Kirk, Students' Fl.* 322.

Var. *integrifolia*, Kirk, l.c.—Stems small, 1-2 in., almost simple. Leaves linear, entire, obtuse. Peduncle terminal, slender. Head small, $\frac{1}{8}$ - $\frac{1}{4}$ in. diam.—*C. integrifolia*, *Hook. f. Fl. Tasm.* i. 192, t. 50B.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLAND: Not uncommon in wet places in lowland districts. October-February.

Widely spread through the south temperate zone; also found in some parts of Europe and North America, but probably naturalised only.

2. *C. australis*, *Hook. f. Fl. Nov. Zel.* i. 128.—A slender much-branched flaccid herb 2-6 in. high; branches spreading, prostrate or suberect, more or less clothed with long lax hairs or almost

glabrous. Leaves $\frac{1}{2}$ –1 in. long, oblong in outline, membranous, deeply pinnatifid or bipinnatifid; ultimate segments linear, entire, acute or mucronate. Heads $\frac{1}{10}$ – $\frac{1}{5}$ in. diam., on long slender peduncles; involucral bracts in 2 series, linear-oblong, obtuse. Female florets numerous, in 3 series, on slender pedicels; corolla wanting. Disc-florets comparatively few, subsessile; corolla tubular, dilated at the base, 4-toothed at the tip. Achenes of the female florets obovate, with a broad thick wing, glandular on both faces; those of the disc-florets much smaller, glabrous, hardly winged.—*Handb. N.Z. Fl.* 141; *Fl. Tasm.* i. 191, t. 50A; *Benth. Fl. Austral.* iii. 550; *Kirk, Students' Fl.* 322. *C. venosa*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 388. *Strongylosperma australe*, *Less. Syn. Comp.* 261.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in lowland districts. September–March.

Also found in Australia, Tasmania, and Tristan d'Acunha; and perhaps not really different from a South African plant.

3. *C. atrata*, *Hook. f. Handb. N.Z. Fl.* 142.—Rhizome stout, creeping, tortuous; roots long and stringy. Stems 1–6 in. high, erect or ascending, stout, leafy, densely pubescent. Leaves $\frac{1}{2}$ –1½ in. long, thick and fleshy, pubescent on both surfaces; petiole broad, flat, sheathing at the base; blade linear-oblong or linear-obovate in outline, pinnatifid; segments close-set, entire or toothed or again pinnatifid; cauline leaves smaller, pinnatifid or lobed. Heads subglobose, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., black or brownish-yellow; involucral bracts in 2–4 series, linear-obovate, entire or pinnatifid, shorter than the florets or equalling them. Female florets in 3–5 series; corolla cylindric, rugose, 3–4-toothed. Disc-florets with a long rugose tube and narrow funnel-shaped 4-toothed limb. Achenes linear-oblong or linear-obovoid, rugose.—*Kirk, Students' Fl.* 323.

SOUTH ISLAND: Dry shingle slopes in alpine localities, Nelson to Otago; not uncommon. 3500–6500 ft. January–February.

Easily recognised by the greyish-green foliage and almost black heads. It is a variable plant in the size of the heads, length of the involucral bracts, and in their being sometimes entire, sometimes pinnatifid.

4. *C. plumosa*, *Hook. f. Handb. N.Z. Fl.* 141.—A large densely tufted aromatic species, often forming broad soft patches, everywhere clothed with long villous hairs. Stems short, stout, creeping. Leaves on long slender petioles 3–6 in. long; blade 2–6 in., oblong in outline, flaccid and membranous, finely 3–4-pinnatifid; primary divisions close-set, linear-oblong, recurved, 2-pinnatifid on the upper side; ultimate segments $\frac{1}{2}$ in. long, linear, toothed on one side. Peduncles slender, shorter than the leaves, usually with a linear entire or pinnatifid bract about the middle. Head $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; involucral bracts in 2 or 3 series, broadly oblong, with broad

purplish-black margins. Receptacle conical. Female florets in 2-3 series, shortly pedicelled; corolla compressed, swollen at the base, contracted towards the mouth, unequally 4-toothed. Disc-florets funnel-shaped, 5-toothed. Achenes of the female florets obovoid; those of the disc-florets minute, abortive.—*Kirk, Students' Fl.* 323. *Leptinella plumosa*, *Hook. f. Fl. Antarct.* i. 26, t. 20.

AUCKLAND AND CAMPBELL ISLANDS: *Hooker! Kirk! Chapman!* ANTIPODES ISLAND: *Kirk!* MACQUARIE ISLAND: *Scott, A. Hamilton.* December-January.

A very handsome species, easily recognised by the large pale-green feathery foliage. It is also found in Kerguelen Island and the Crozets.

5. *C. lanata*, *Hook. f. Handb. N.Z. Fl.* 141.—Stems stout, prostrate and rooting below, ascending at the tips, branched, 3-12 in. long, densely clothed with white woolly hairs or glabrate. Leaves 1-3 in. long, woolly or glabrate, rather thick, with broad sheathing petioles; blade oblong in outline, pinnate or pinnatifid; pinnæ close-set, curved, 3-5-toothed or -lobed along the upper edge, minutely glandular. Peduncles terminal, shorter than the leaves, stout, woolly. Heads $\frac{1}{4}$ - $\frac{1}{3}$ in. diam.; involucre bracts in several series, broadly oblong, obtuse, green. Florets all studded with pellucid conglobate glands; females ovate-oblong, broadest at the base, narrow at the mouth and minutely 4-toothed; disc-florets narrow funnel-shaped, 5-toothed. Achenes of the female florets obovate, compressed; those of the disc-florets minute, abortive.—*Kirk, Students' Fl.* 323. *Leptinella lanata*, *Hook. f. Fl. Antarct.* i. 25, t. 19. *L. propinqua*, *Hook. f. l.c.* 27.

AUCKLAND AND CAMPBELL ISLANDS: *Hooker, Kirk! Chapman!* December-January.

Distinguished from the preceding by the smaller size, stouter habit, leaves not so finely cut, smaller heads, and glandular florets.

6. *C. Muelleri*, *T. Kirk, Students' Fl.* 324.—Stems long, rather stout, creeping and rooting, branched, sparingly villous towards the tips; branches ascending. Leaves 2-5 in. long; petiole $\frac{3}{4}$ -2 in., sheathing at the base; blade 1-3 in., linear-obovate, membranous, glabrate or slightly silky, gland-dotted, deeply pinnatifid; segments oblong, closely toothed or lobed, teeth acute. Peduncles 1-3 in. long, usually shorter than the leaves, pubescent. Heads $\frac{1}{3}$ in. diam.; involucre bracts in about 3 series, oblong-ovate, obtuse or subacute, membranous. Female florets in many rows, usually more numerous than the disc-florets; corolla short, ovoid, not glandular. Disc-florets larger; corolla tubular, 4-toothed; style undivided. Achenes of the female florets clavate, tetragonous.—*Leptinella potentillina*, *F. Muell. Veg. Chath. Is.* 28, t. 6.

CHATHAM ISLANDS: Not uncommon in moist places, *H. H. Travers!*
Enys! Cockayne and Cox!

This was apparently referred to *C. lanata* by Sir J. D. Hooker (Handb., p. 733), but it differs from that plant in being much less woolly, in the larger leaves with broader toothed segments, longer peduncles, and glandless florets.

7. **C. Traillii**, *T. Kirk, Students' Fl.* 324.—Stems slender, creeping and rooting, 3–12 in. long, silky towards the tips. Leaves 1–3 in.; petiole slender, sheathing at the base; blade linear-obovate, membranous, glabrate or with scattered lax hairs on both surfaces, deeply pinnatifid; segments close-set, broadly oblong, toothed on the upper margin and round the apex, teeth apiculate or hair-tipped. Peduncles axillary, pubescent, usually shorter than the leaves. Heads $\frac{1}{2}$ in. diam., involucral bracts in 2–3 series, orbicular-ovate, membranous, with scarious purplish margins. Female florets few, in 1 series, shortly stipitate; corolla ovoid, compressed. Disc-florets very numerous, funnel-shaped, 4-lobed; style undivided, with a discoid stigma. Achenes of the female florets broadly ovoid or almost orbicular, turgid, 3-winged.

STEWART ISLAND: Chiefly on sand-dunes, *Kirk!* December–February.

Very closely allied to *C. Muelleri*, of which it may be a variety. The habit is the same, and the leaves can only be distinguished by the smaller size and apiculate segments. But the heads are markedly different in the few female florets, which are in one row only, and have much broader achenes.

8. **C. Maniototo**, *Petrie in Trans. N.Z. Inst.* xiv. (1882) 362.—Small, densely matted, forming broad greyish patches; everywhere covered with long silky hairs. Stems $\frac{1}{2}$ –3 in. long, creeping and rooting; branches very short, leafy. Leaves numerous, silky on both surfaces, dilated and sheathing at the base, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, linear-oblong, deeply pinnatifid; segments narrow-linear, acute. Heads terminating the branches, almost sessile, minute, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam.; involucral bracts in 2 series, broadly oblong or obovate, obtuse, silky on the outside, membranous. Female florets in 1 or 2 series; corolla narrow-tubular, almost fliform, with a 2-lipped mouth; style exserted, 2-fid. Disc-florets much larger; corolla funnel-shaped with a long tube, 4–5-toothed; anthers and style exserted. Achenes of the female florets oblong, smooth and turgid, hardly winged; those of the disc-florets minute, abortive.—*Kirk, Students' Fl.* 323.

SOUTH ISLAND: Canterbury—Lake Lyndon, *Enys! Kirk! T. F. C.*; Lake Tekapo, *T. F. C.* Otago—Kakanui, Maniototo Plain, Nevis Valley, Mossburn, Lake Te Anau, *Petrie! Buchanan!* Sea-level to 3000 ft. January–February.

A very distinct little plant, probably common throughout the South Island.

9. **C. minor**, *Hook. f. Handb. N.Z. Fl.* 142.—Stems slender, creeping, branched, 2–12 in. long or more, glabrous or silky at the

tips. Leaves alternate on slender creeping runners or fascicled on short lateral branchlets, thin and membranous, glabrous or slightly silky, $\frac{1}{2}$ –2 in. long, linear-oblong or linear-obovate in outline, pinnatifid almost to the base; segments close-set or the lower distant, oblong or obovoid, recurved, deeply and acutely toothed on both edges or on the upper only. Peduncles slender, naked, shorter or longer than the leaves. Heads small, $\frac{1}{8}$ – $\frac{1}{5}$ in. diam.; involucral bracts few, 8–12, broadly oblong or orbicular, usually with broad purplish margins. Female florets in 3–4 series; corolla inflated, broadly ovoid, with a narrow 2–3-toothed mouth. Disc-florets fewer in number, funnel-shaped, 4-toothed. Achenes of the female florets obovoid, glandular.—*Kirk, Students' Fl.* 324. *Leptinella minor*, *Hook. f. Fl. Nov. Zel.* i. 129. *Soliva tenella*, *A. Cunn. Precur.* n. 445.

NORTH AND SOUTH ISLANDS: Not uncommon from the North Cape southwards. Sea-level to 2500 ft. November–January.

10. **C. filiformis**, *Hook. f. Handb. N.Z. Fl.* 142. —“A very slender rigid creeping plant, glabrous or pilose. Leaves minute, $\frac{1}{4}$ in. long, oblong, pinnatifid, segments subulate. Scapes filiform, 1 in. long, naked. Heads minute, $\frac{1}{10}$ in. diam.; involucral scales 6–8, orbicular, with purple edges; receptacle conical; ray-florets about 20; corolla short, compressed, inflated, very broad-oblong, 2-lobed above; achene obconic, glandular; disc-florets funnel-shaped, 4-lobed; lobes glandular.”—*Kirk, Students' Fl.* 325.

SOUTH ISLAND: “Canterbury Plains, amongst grass, *Haast*.”

This does not seem to have been collected since its original discovery, more than forty years ago. Not having seen specimens, I have reproduced Hooker's description.

11. **C. Haastii**, *T. Kirk, Students' Fl.* 325. —Stems rather short, stout, creeping, branched, 1–6 in. long or more, pubescent. Leaves $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, pubescent on both surfaces, gland-dotted, linear-oblong or linear-obovate, deeply pinnatifid or almost pinnate; segments narrow-oblong, recurved, entire or deeply toothed or incised, teeth often confined to the upper margin. Peduncles slender, pubescent, much longer than the leaves. Heads $\frac{1}{8}$ – $\frac{1}{4}$ in. diam.; involucral bracts in 2–3 series, broadly oblong, obtuse, with broad purple tips. Receptacle convex. Female florets in 3–4 series; corolla short, ovoid, compressed. Disc-florets very numerous, funnel-shaped, with 4 short and broad teeth. Achene oblong-obovoid, obscurely angled, glandular.

SOUTH ISLAND: Canterbury Plains, *Haast*! *Petrie*; Banks Peninsula, *Haast*! *Kirk*! *Cockayne*! Sea-level to 2500 ft. December–January.

Closely allied to *C. pectinata*, but the leaves are broader, with the segments deeply toothed or incised.

12. *C. pectinata*, Hook. f. *Handb. N.Z. Fl.* 142.—Stems 1–6 in. long, creeping and rooting, rather stout, wiry, woolly or glabrate, often putting out silky runners. Leaves few, scattered, rigid, glabrous or silky, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, linear-oblong in outline, pectinately pinnatifid; segments short, subulate, entire. Peduncles slender, naked or rarely with a minute bract about the middle, 1–3 in. long, exceeding the leaves. Heads $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., involucrel bracts in 2–3 series, broadly oblong, pubescent, purplish; margins jagged. Female florets in several series; corolla ovoid, compressed, minutely 2–4-toothed at the narrow mouth. Disc-florets funnel-shaped, 4-toothed. Achene narrow-obovoid, compressed and slightly winged.—Kirk, *Students' Fl.* 325.

Var. *sericea*, Kirk, l.c. 326.—Smaller and more compactly branched, everywhere clothed with long dense silky hairs. Peduncles shorter and stouter, $\frac{1}{2}$ –1 in. long. Heads $\frac{1}{3}$ in. diam. Perhaps a distinct species.

SOUTH ISLAND: Nelson—Clarence Valley, T. F. C.; Mount Captain, Kirk! Canterbury—Mount Torlesse, Haast! mountains above the Broken River, Enys! Kirk! T. F. C. Otago—Lake district, Hector and Buchanan! common in mountain districts, Petrie! Var. *sericea*: Old Man Range and Mount Cardrona, Petrie! Ben Lomond, Cockayne! Altitudinal range from 1500 to 6000 ft. December–January.

13. *C. Goyeni*, Petrie in *Trans. N.Z. Inst.* xviii. (1886) 295.—A small tufted species. Stems 1–3 in. long, creeping and rooting, much branched; branches short, ascending at the tips, with the leaves $\frac{1}{4}$ in. diam. Leaves alternate, imbricate, appressed to the branch, $\frac{1}{8}$ – $\frac{1}{5}$ in. long; lower half broad, membranous, glabrous or more or less pubescent, sheathing at the base; upper half cut straight down into 5–7 linear-subulate erect lobes. Heads terminal, minute, $\frac{1}{8}$ in. diam., on short woolly peduncles rarely exceeding the leaves; involucrel bracts in 1 or 2 series, ovate-oblong, with scarious purple margins. Female florets few, in 1 series; corolla ovoid, compressed, narrowed at the mouth. Disc-florets numerous, funnel-shaped. Mature achenes not seen.—Kirk, *Students' Fl.* 326.

Var. *pinnatisecta*, Kirk, l.c.—Leaves pinnatifid, clothed with silky hairs.

SOUTH ISLAND: Otago—Mount Pisa and the Hector Mountains, Petrie! 5000–6000 ft. January–February.

A curious little plant, perhaps nearest to *C. pectinata*. The leaves closely resemble those of *Azorella Selago*.

14. *C. Featherstonii*, F. Muell. ex Hook. f. *Handb. N.Z. Fl.* 733.—Stems 6–12 in. long or more, rather stout, prostrate or decumbent at the base, ascending above, much branched, leafy, clothed with short soft pubescence. Leaves alternate, $\frac{3}{4}$ –2 in. long, obovate-spathulate or oblong-spathulate, gradually narrowed to a sessile base, crenately 3- or 5-toothed at the tip or entire, flat, fleshy, finely and softly pubescent on both surfaces. Peduncles

axillary and terminal, $\frac{1}{2}$ –1 in. long. Heads $\frac{1}{3}$ in. diam., yellow; involucral bracts 10–15, in about 2 series; outer ovate-lanceolate, inner broadly oblong. Female florets in many series; corolla ovoid or conical, swollen at the base, obscurely toothed at the contracted mouth. Disc-florets numerous, tubular, 4-toothed. Achenes narrow-obovoid, prominently costate, glandular.—*Kirk, Students' Fl.* 326. *Leptinella Featherstonii*, *F. Muell. Veg. Chath. Is.* 27, t. 5.

CHATHAM ISLAND: Usually near the coast, *H. H. Travers!* *Cockayne* and *Cox!*

A very remarkable species, quite unlike any other.

15. *C. linearifolia*, *Cheesem. in Trans. N.Z. Inst.* xv. (1883) 299.—Small, dark-green, rather thick and fleshy, aromatic, sparingly pilose. Stems prostrate, branched, ascending at the tips. Leaves alternate, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, narrow-linear or linear-spathulate, obtuse, gradually narrowed to the sheathing base, quite entire, coriaceous, gland-dotted. Peduncles 2–4 in. long, slender, terminal, with 4–8 small linear bracts. Heads unisexual, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam.; involucral bracts in about 3 series, linear-oblong, obtuse, with purplish scarious margins. Receptacle convex. Florets studded with transparent glands; female corolla swollen at the base, obscurely tetragonous, narrowed above, minutely 4-toothed; corolla of the males smaller and more slender, narrow funnel-shaped, 4-lobed. Achene linear-obovoid, compressed.—*Kirk, Students' Fl.* 326.

SOUTH ISLAND: Nelson—Mountains flanking the Wairau Valley, *T. F. C.* 3000–4500 ft. December–January.

Distinguished from *C. pyrethrifolia* by the entire leaves. In outward appearance it closely resembles *Abrotanella linearis*.

16. *C. pyrethrifolia*, *Hook. f. Handb. N.Z. Fl.* 142.—Stout, rather fleshy, aromatic, glabrous or sparingly pilose. Rhizome creeping, often branched; stems prostrate or decumbent at the base, ascending at the tips. Leaves alternate, fleshy or coriaceous, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long; petiole usually half the length, sheathing at the base; blade pinnatifidly cut into 5–8 alternate narrow-linear to linear-oblong obtuse segments $\frac{1}{10}$ – $\frac{1}{4}$ in. long. Peduncles variable in length, $\frac{1}{2}$ –4 in., with 1 or several linear bracts. Heads unisexual, large, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam.; involucral bracts in 2–3 series, linear-oblong, obtuse, herbaceous, with purplish scarious margins. Receptacle convex. Florets glandular; corolla of the females inflated and truncate at the base, 4-toothed at the mouth; of the males funnel-shaped, 4-lobed. Achene narrow-obovoid.—*Kirk, Students' Fl.* 327.

SOUTH ISLAND: Abundant in mountain districts in Nelson, Marlborough, and Canterbury, rare and local in Otago. 2500–6000 ft. December–February.

17. **C. perpusilla**, *Hook. f. Handb. N.Z. Fl.* 143.—Often forming broad patches, more or less silky in all its parts. Rhizome much branched, creeping, rigid and wiry, 2–9 in. long or more; branchlets short, erect, leafy. Leaves tufted, silky on both surfaces, $\frac{1}{4}$ –1 in. long, linear-oblong or linear-obovate, deeply pinnatifid; segments close-set, sometimes slightly recurved, deeply serrate on the upper edge or entire. Peduncles short, stout, rigid, silky, $\frac{1}{4}$ – $\frac{3}{4}$ in. long. Heads unisexual; males $\frac{1}{8}$ – $\frac{1}{6}$ in. diam.; involucre bracts in 1 or 2 series, broadly oblong, silky, with broad purple scarious margins. Florets numerous, eglandular, funnel-shaped. Female heads larger, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam.; involucre bracts in 3–4 series, larger and broader than in the males, incurved over the florets and often concealing them. Florets numerous; corolla ovoid, inflated at the base, contracted at the minutely toothed mouth. Achenes somewhat curved, rounded on the back or obscurely trigonous.—*Kirk, Students' Fl.* 327. *Leptinella pusilla*, *Hook. f. Fl. Nov. Zel.* i. 129.

NORTH ISLAND: East Cape and Hawke's Bay, *Colenso!* SOUTH ISLAND: Not uncommon throughout. Sea-level to 4500 ft. November–February.

18. **C. squalida**, *Hook. f. Handb. N.Z. Fl.* 143.—Stems long, slender, creeping, branched, 4–12 in. long or more, silky or pilose; branchlets short, erect. Leaves 1–2 in. long, linear-obovate in outline, petiolate, flaccid and membranous, more or less pilose with long soft hairs, deeply pinnatifid; segments rather lax, recurved, deeply incised along the upper margin or more rarely along both margins. Peduncles 1–3 in. long, slender, naked, silky. Heads unisexual; males $\frac{1}{6}$ – $\frac{1}{2}$ in. diam.; involucre bracts few, in 2 series, broadly oblong-obovate, silky, with broad purplish scarious margins. Florets numerous, eglandular, funnel-shaped. Female heads larger, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam.; involucre bracts in 3–4 series, broad, rounded, silky, purplish, usually incurved over the florets and concealing them. Florets numerous; corolla ovoid, inflated at the base, much contracted at the mouth, minutely 4-toothed. Achene curved, rounded at the back, almost trigonous.—*Kirk, Students' Fl.* 328. *Leptinella squalida*, *Hook. f. Fl. Nov. Zel.* i. 129.

NORTH ISLAND: Bay of Plenty, *Petrie!* East Cape and Hawke's Bay, *Colenso!* Mount Hikurangi, *Adams* and *Petrie!* Mount Egmont ranges, *T. F. C.* SOUTH ISLAND: Not uncommon from Nelson to Foveaux Strait. Sea-level to 4000 ft. December–February.

Closely allied to *C. perpusilla*, but distinguished by the greater size, soft flaccid leaves with deeply incised segments, and by the larger pistillate heads, which have the involucre bracts so much incurved as to completely hide the florets.

19. **C. dioica**, *Hook. f. Handb. N.Z. Fl.* 143.—Stems creeping, rather stout or slender, glabrous or slightly hairy, 3–12 in. long. Leaves tufted or solitary, membranous, often flaccid, petiolate,

$\frac{1}{2}$ –2 in. long, linear-obovate or spathulate, obtuse, crenate-serrate or lobulate or semipinnatifid, often deeply pinnatifid or pinnate at the base, lobes or segments entire or the upper margins more or less deeply toothed or incised. Peduncles axillary, longer or shorter than the leaves, naked, pubescent. Heads unisexual; males $\frac{1}{6}$ – $\frac{1}{4}$ in. diam.; involucre bracts few, in 2 series, oblong-orbicular, pubescent, with broad purple scarious margins. Florets numerous, eglandular, funnel-shaped. Female heads larger, $\frac{1}{5}$ – $\frac{1}{3}$ in. diam. or more; involucre bracts more numerous, imbricated in 3 or 4 series, incurved. Florets many; corolla ovoid-conic, inflated at the base, narrowed and minutely toothed at the mouth. Achene obovoid, curved, rounded at the back.—*Kirk, Students' Fl.* 328. *Leptinella dioica*, *Hook. f. Fl. Nov. Zel.* i. 129.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from the Great Barrier Island and the Kaipara Harbour southwards; most plentiful near the sea, but ascending to 3000 ft. November–February.

A most puzzling plant, exceedingly variable in the size of the leaves and the extent to which they are toothed or divided, and also varying much in the size of the flower-heads. Mr. Kirk divided it into three species; but these are clearly connected by intermediate forms, and cannot always be distinguished by the descriptions he has given. The following are the chief varieties, but it must be borne in mind that the characters used to separate them are purely arbitrary.

Var. **a.**—Leaves 1–2 in., obovate-spathulate, membranous, flaccid, toothed or lobulate above, pinnatifid below, segments entire or toothed. Abundant.

Var. **crenatifolia**, *Kirk, Students' Fl.*—Leaves $\frac{3}{4}$ –3 in., oblong-spathulate, membranous, crenate-toothed, with a few deeper divisions at the base of the leaf. Mountain swamps in the South Island.

Var. **rotundata**.—More robust, hairy. Leaves $\frac{1}{2}$ –1 $\frac{1}{2}$ in., orbicular-spathulate, toothed above, usually lobulate or pinnatifid below.—Cliffs between the Manukau and Kaipara Harbours, *T. F. C.*; East Coast, *Colenso*!

Var. **pulchella**.—Slender. Leaves $\frac{1}{3}$ –2 $\frac{1}{2}$ in., linear-oblong or linear-obovate, membranous but firm, pinnatifid, often pinnate at the base. Often difficult to separate from var. *a*, but leaves usually narrower and more deeply divided.—*C. pulchella*, *Kirk, Students' Fl.* 328. Swamps in the South Island, Stewart Island.

Var. **obscura**.—Very small, $\frac{3}{4}$ –1 in. long. Leaves few, $\frac{1}{3}$ – $\frac{1}{2}$ in., oblong-lanceolate or linear-oblong, lobed or pinnatifid, lobes 3 or 4 on each side. Heads small, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam.—*C. obscura*, *Kirk, l.c.* 327. Swamps at Woodend, Southland, *Kirk*!

17. CENTIPEDA, Lour.

Annual or perennial herbs. Leaves alternate, entire or coarsely toothed. Heads small, sessile on the branches or racemose, heterogamous and discoid. Involucre hemispherical; bracts in 2 series, subequal, margins scarious. Receptacle flat or convex, naked. Female florets exterior, in several rows, fertile; corolla minute, tubular, obscurely lobed. Disc-florets few, hermaphrodite, cam-

panulate, 4-lobed. Anthers obtuse at the base. Style-branches of the disc-florets short, truncate. Achenes scarcely compressed, obtusely 3-4-ribbed or -angled. Pappus wanting.

A small genus of 4 species, 3 of which are Asiatic or Australasian, the fourth South American. It is closely allied to *Cotula*, but differs in the inflorescence and in the tubular corollas of the female florets. The New Zealand species extends to Australia, the Pacific islands, and eastern tropical Asia.

1. *C. orbicularis*, *Lour. Fl. Cochinch.* ii. 493.—A strong-smelling prostrate or suberect much-branched glabrous or sparsely woolly annual; stems 3-9 in. long, spreading from the root. Leaves $\frac{1}{4}$ – $\frac{2}{3}$ in. long, oblong or oblong-lanceolate or obovate-oblong, narrowed at the base, sparingly irregularly toothed or almost pinnatifid, glabrous or rarely hairy. Heads $\frac{1}{8}$ – $\frac{1}{4}$ in. diam., globose, solitary, axillary, sessile or rarely on very short peduncles; involucre bracts broadly oblong, membranous. Female florets very numerous; corolla minute, 4-lobed. Disc-florets few; corolla campanulate. Achenes tetragonous, slightly hairy.—*Kirk, Students' Fl.* 329. *Myriogyne minuta*, *Less. in Linnæa*, vi. (1831) 219; *A. Cunn. Precur.* n. 444; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 130; *Benth. Fl. Austral.* iii. 553. *Cotula minuta*, *Forst. Prodr.* n. 301; *A. Rich. Fl. Nouv. Zel.* 235; *Hook. f. Handb. N.Z. Fl.* 144.

NORTH AND SOUTH ISLANDS: Not uncommon from the North Cape to Central Otago. Sea-level to 2000 ft. January–March.

18. ABROTANELLA, Cass.

Glabrous perennial herbs, always of small size, often moss-like. Leaves alternate, imbricate, quite entire. Heads small, solitary or crowded in little terminal corymbs, heterogamous and discoid. Involucre campanulate; bracts few, in about 2 series, nearly equal or the outer shorter. Receptacle small, naked. Female florets exterior, in 1 series, tubular, 3-4-toothed, fertile. Disc-florets hermaphrodite or male, tubular, 4-toothed. Anthers obtuse or shortly pointed at the base. Style-branches of the disc-florets very short, truncate. Achenes 4-angled or -ribbed, clavate, terete or compressed. Pappus wanting.

A small genus of about 14 species, most abundant in New Zealand, but also found in Australia and Tasmania, Fuegia, and the Falkland Islands. One species has also been described from Rodriguez. All the New Zealand species are endemic.

* Heads several in a small terminal cluster.

Leaves $\frac{1}{2}$ –1 in., linear-spathulate. Heads on a short leafy peduncle. Achenes obovoid or tetragonous. 1. *A. spathulata*.
 Leaves $\frac{1}{4}$ – $\frac{1}{3}$ in., narrow ovate or lanceolate. Heads almost hidden among the upper leaves. Achenes with 4 short horns 2. *A. rosulata*.

** Heads solitary.

- Loosely tufted. Leaves $\frac{1}{2}$ –3 in., linear. Scape slender, bracteate, $\frac{1}{2}$ –3 in. Achenes clavate 3. *A. linearis*.
 Forming broad flat patches. Leaves $\frac{1}{2}$ – $\frac{1}{3}$ in., linear or linear-spathulate. Scares $\frac{1}{4}$ – $\frac{1}{2}$ in. 4. *A. cæspitosa*.
 Forming soft rounded patches. Leaves $\frac{1}{4}$ – $\frac{1}{3}$ in., linear-subulate, broadest at the base. Achenes linear-clavate, 4-ribbed 5. *A. inconspicua*.
 Densely tufted, $\frac{1}{2}$ –1 in. high. Leaves narrow-linear, recurved. Achenes linear-clavate, 4-angled 6. *A. pusilla*.
 Very minute. Stems $\frac{1}{8}$ – $\frac{1}{4}$ in. Leaves $\frac{1}{4}$ in., linear-oblong, truncate, margins thickened. Achenes setose, with 4 long bristles 7. *A. muscosa*.

1. *A. spathulata*, Hook. f. *Handb. N.Z. Fl.* 139.—Stems short, loosely tufted, 1–3 in. long, branched, creeping at the base, erect above. Leaves crowded, spreading, $\frac{1}{2}$ –1 in. long, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, narrow linear-spathulate, acute or obtuse, narrowed to the base, 3–7-nerved, flat, coriaceous. Heads about $\frac{1}{8}$ in. long, in a small terminal corymb either raised on a short leafy peduncle or almost hidden amongst the upper leaves; involucre bracts 8–12, oblong, with 3 translucent nerves. Florets 8–12; disc-florets with a 4-angled corolla with 4 short erect teeth; corolla of the females tubular with a globose base and 4 short spreading teeth. Achenes of the female florets obcvoid, compressed, with 3 cellular ribs; of the disc-florets tetragonous.—Kirk, *Students' Fl.* 330. Trineuron spathulatum, Hook. f. *Fl. Antarct.* i. 24, t. 17.

AUCKLAND AND CAMPBELL ISLANDS: Peaty soil on the hills, 500–2000 ft., Hooker, Kirk! Buchanan! January–February.

2. *A. rosulata*, Hook. f. *Handb. N.Z. Fl.* 139.—A small much-branched densely tufted little plant $\frac{1}{2}$ –1 $\frac{1}{2}$ in. high. Leaves closely imbricate, spreading or recurved, the upper rosulate, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, narrow ovate or lanceolate, acute, rigid and coriaceous, concave above, nerved beneath. Heads $\frac{1}{10}$ in. long, in terminal clusters of 3–6 amongst the upper leaves; involucre bracts 8–10, linear-oblong, coriaceous, nerved. Florets 8–10; disc-florets with a 4-angled corolla with 4 short erect teeth; corolla of the female florets tubular with 4 spreading teeth. Achene oblong-obovoid, 4-angled, the angles produced upwards into short horns.—Kirk, *Students' Fl.* 331. Ceratella rosulata, Hook. f. *Fl. Antarct.* i. 25, t. 18.

CAMPBELL ISLAND: In crevices of rocks, rare, Hooker, Kirk! 1000–1400 ft. January–February.

A harsh and rigid little plant, easily distinguished from the other species by the short horns to the achenes.

3. *A. linearis*, Bergg. in *Minnesk. Fisiog. Sallsk. Lund.* viii. (1877) 14, t. 3, f. 28–38.—Rhizome creeping, branched. Stems slender, tufted, leafy at the base, 1–4 in. high. Leaves radical,

numerous, spreading, $\frac{1}{2}$ –3 in. long, linear, often curved, obtuse, coriaceous, more or less pilose towards the sheathing base. Scapes slender, $\frac{1}{2}$ –3 in. high, sometimes forked, with 2–5 linear obtuse bracts. Heads usually solitary, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam.; involucral bracts 8–14, linear-oblong, subacute, 3-nerved. Florets 20–24; females swollen at the base, deeply 4-lobed; disc-florets larger, tubular, with 4 short erect teeth. Achenes clavate, obtusely 4-gonous.—*Kirk in Trans. N.Z. Inst.* xxiv. (1892) 420; *Students' Fl.* 331.

SOUTH ISLAND: Not uncommon on the mountains from Nelson to Foveaux Strait; most plentiful on the western side of the central range; altitudinal range from 2500 to 4500 ft. STEWART ISLAND: Not uncommon. Sea-level to 2500 ft. December–January.

4. *A. cæspitosa*, *Petrie ex T. Kirk in Trans. N.Z. Inst.* xxiv. (1892) 420.—A small densely tufted moss-like plant, often forming broad flat patches; stems seldom more than $\frac{1}{2}$ in. high. Leaves numerous, spreading or recurved, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, linear or linear-spathulate, obtuse, sheathing at the base, rather fleshy, flat or slightly concave, margins scarious when young. Scapes very short, often almost wanting; bracts 1 or 2, linear. Heads solitary, $\frac{1}{10}$ in. diam.; involucral bracts about 8, linear-oblong, 3-nerved. Florets 6–8, precisely similar to those of *A. linearis*. Achenes clavate, obscurely tetragonous.—*Kirk, Students' Fl.* 331.

SOUTH ISLAND: Nelson—Mount Arthur, Mount Owen, *T. F. C.* Canterbury—Mountains above the Broken River, Craigieburn Mountains, *Petrie ! T. F. C.* Otago—Clarke's Diggings, Mount Ida, Mount Kyeburn, *Petrie !* 3000–6000 ft. December–January.

Probably only an alpine state of *A. linearis*.

5. *A. inconspicua*, *Hook. f. Handb. N.Z. Fl.* 140.—A densely tufted moss-like plant, forming soft rounded patches; stems $\frac{1}{2}$ –2 in. long, densely leafy. Leaves numerous, spreading or ascending, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear-subulate, broad and membranous at the base, with ciliate margins, gradually tapering to a subacute thick and fleshy tip, rigid when dry. Head solitary, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam., sunk amongst the uppermost leaves; involucral bracts linear-oblong, obtuse, 3-nerved. Florets 15–20; females narrow-tubular, slightly swollen at the base, lobes 4, spreading; disc-florets larger, between funnel-shaped and tubular, with 5 short erect lobes. Achene linear-clavate, 4-ribbed.—*Buch. in Trans. N.Z. Inst.* xiv. (1882) 354, t. 34, f. 1; *Kirk, Students' Fl.* 331.

SOUTH ISLAND: Otago—Mount Alta, *Hector and Buchanan !* Black Peak, *A. McKay !* common on all the higher mountains of the interior, *Petrie !* 4000–6000 ft. December–January.

6. *A. pusilla*, *Hook. f. Handb. N.Z. Fl.* 139.—A minute tufted moss-like plant. Stems slender, wiry, leafy, $\frac{1}{2}$ –1 in. long, emitting long fibrous roots. Leaves crowded, spreading or recurved, $\frac{1}{2}$ in.

long, narrow-linear, acute, curved, rigid, coriaceous, flat above, midrib prominent beneath. Head solitary, $\frac{1}{10}$ in. diam., sunk amongst the uppermost leaves; involucral bracts linear, obtuse, coriaceous, nerved. Style of the disc-florets bifid. Achenes of the female florets linear-clavate, 4-angled.—*Kirk, Students' Fl.* 332. *Trineuron pusillum*, *Hook. f. Fl. Nov. Zel.* i. 131.

NORTH ISLAND: Snowy places on the Ruahine Mountains, *Colenso!*

This species has not been collected since its original discovery, more than fifty years ago. I have only seen a fragment of one of the type specimens, and the above description is based upon that given by Hooker.

7. *A. muscosa*, *T. Kirk in Trans. N.Z. Inst.* xxiv. (1892) 422, t. 36.—Stems very minute, $\frac{1}{8}$ – $\frac{1}{4}$ in. high, either solitary or forming dense patches $\frac{1}{2}$ –1 in. diam. Leaves closely imbricating, erect, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear or linear-oblong, truncate or retuse at the tip; upper half excessively coriaceous and rigid, somewhat concave, margins much thickened and cartilaginous; lower half membranous, sheathing. Heads minute, solitary, concealed amongst the uppermost leaves; involucral bracts 5, oblong, obtuse or acute or apiculate, nerveless or nearly so. Florets 4–8; females narrow, cylindrical, obscurely toothed at the mouth; disc-florets tubular, 4-toothed. Achenes oblong, truncate above, setose, obscurely tetraginous, with a long bristle at each angle.—*Students' Fl.* 332.

STEWART ISLAND: Summit of Rakiwha, 2300 ft., *Kirk!* January.

A very remarkable little plant, closely allied to *A. emarginata*, Cass., from the Falkland Islands. It is one of the smallest flowering plants in the colony, and in a barren state might easily be mistaken for a *Bryum* or *Tortula*.

19. ERECHTITES, Rafin.

Erect annual or perennial herbs, cottony or glabrous. Leaves alternate, toothed or lobed or pinnately divided, rarely entire. Heads narrow, in terminal corymbs, heterogamous and discoid. Involucre cylindric; bracts in 1 series, linear, equal, appressed, sometimes with a few small ones at the base. Receptacle flat, naked. Female florets in 2–3 rows at the circumference, very slender, filiform, minutely 3–5-toothed. Disc-florets hermaphrodite, fewer in number than the females, tubular with a broad 5-toothed mouth. Anthers obtuse at the base. Style-branches of the disc-florets elongated, truncate at the tip. Achenes linear-oblong, obtuse or contracted towards the apex, striate or angular. Pappus-hairs in many series, copious, soft, excessively slender.

A genus of about 15 species, mainly Australasian and South American; but one species is found in North America, and another in Java. Three of the New Zealand species extend to Australia and Tasmania; the remaining three are endemic.

* Involucral bracts 8-10.

Glabrous or nearly so. Leaves membranous, usually regularly denticulate 1. *E. prenanthoides*.

** Involucral bracts 10-14.

- Cottony or woolly. Leaves linear-oblong, lobed or pinnatifid 2. *E. arguta*.
 Scabrid with short white hairs. Leaves linear-oblong, lobed or pinnatifid 3. *E. scaberula*.
 White with cottony tomentum. Leaves linear-elongate, entire or minutely remotely toothed; margins revolute 4. *E. quadridentata*.
 Glabrous or nearly so. Leaves erect, lower oblong or linear-oblong, upper linear, entire or denticulate .. 5. *E. diversifolia*.
 Glabrous or nearly so. Leaves spreading, membranous, pinnatifid or pinnate with a large terminal segment .. 6. *E. glabrescens*.

1. *E. prenanthoides*, D.C. *Prodr.* vi. 296. — A tall erect annual or biennial herb 1-4 ft. high, simple or branched above, glabrous or slightly hairy. Leaves rather distant, 2-6 in. long or more, linear-oblong to lanceolate or linear-lanceolate, acuminate, lower petiolate, upper sessile with broad toothed auricles, membranous, regularly or irregularly closely and finely denticulate, rarely lobed. Corymbs very large, terminal, 6-12 in. across or more; pedicels slender, $\frac{1}{4}$ - $\frac{1}{3}$ in. long. Heads quite glabrous, $\frac{1}{4}$ in. long; involucral bracts 8-10, narrow-linear, green with white margins. Florets 18-22; females more numerous than the hermaphrodite. Achenes linear-oblong, grooved, hairy, surmounted by a callous ring surrounding the base of the pappus. — *Hook. f. Fl. Nov. Zel.* i. 141; *Handb. N.Z. Fl.* 156; *Benth. Fl. Austral.* iii. 658; *Kirk, Students' Fl.* 333. *Senecio prenanthoides*, A. Rich. *Sert. Astrol.* 96. *S. heterophyllus*, Col. in *Trans. N.Z. Inst.* xxvii. (1895) 389.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLAND: From Ahipara and Mongonui southwards, but rare and local to the north of the Thames Valley. Sea-level to 3000 ft. October-January. Also in Australia and Tasmania.

2. *E. arguta*, D.C. *Prodr.* vi. 296. — A coarse erect annual herb 1-3 ft. high; stem stout, grooved, branched above, more or less cottony or woolly, rarely almost glabrous. Leaves 2-4 in. long, linear-oblong or lanceolate, acute or obtuse, lower usually contracted into a petiole, upper sessile with a broad toothed stem-clasping base, coriaceous, coarsely and irregularly toothed or lobed or pinnatifid, lobes sinuate-dentate, upper surface glabrous or cobwebby, beneath more or less clothed with loose white cottony tomentum. Corymbs terminal, dense; pedicels slender, cottony. Heads $\frac{1}{4}$ in. long; involucral bracts 12-14, usually with a few minute ones at the base, narrow linear-lanceolate, woolly below. Florets 30-40; females much the most numerous. Achenes linear-

oblong, grooved, hairy, crowned by a callous ring.—*Hook. f. Fl. Nov. Zel.* i. 142; *Handb. N.Z. Fl.* 157; *Benth. Fl. Austral.* iii. 659; *Kirk, Students' Fl.* 334. *Senecio argutus*, *A. Rich. Fl. Nouv. Zel.* 258; *A. Cunn. Precur.* n. 466; *Raoul, Choix*, 45.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 2500 ft. November–February. Also in Australia and Tasmania.

A common plant, varying much in stature, degree of pubescence, and the extent to which the leaves are toothed or divided.

3. *E. scaberula*, *Hook. f. Handb. N.Z. Fl.* 157.—A slender erect annual 1–2 ft. high; stem grooved, simple or branched above, rough with short white hispid hairs. Leaves 1–3 in. long, linear-oblong or lanceolate, acute or obtuse, lower petiolate, upper sessile with small stem-clasping auricles, coarsely and irregularly toothed or pinnatifid, lobes acute, again sharply toothed, both surfaces rough with short hispid hairs. Corymbs terminal, lax; pedicels slender, glabrous. Heads $\frac{1}{4}$ in. long; involucral bracts about 12, glabrous, subulate-lanceolate, acuminate, tips often recurved. Florets 20–30; females the more numerous. Achenes linear-oblong, grooved, hispid, crowned by a small callous ring.—*Kirk, Students' Fl.* 334. *E. hispidula*, *Hook. f. Fl. Nov. Zel.* i. 142 (not of *D.C.*). *E. pumila*, *Armst. in Trans. N.Z. Inst.* xiii. (1881) 338. *Senecio hispidulus*, *A. Cunn. Precur.* n. 462 (not of *A. Rich.*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLAND: Not uncommon from the North Cape southwards. Sea-level to 1500 ft. November–February.

4. *E. quadridentata*, *D.C. Prodr.* vi. 295.—An erect herb 1–3 ft. high, usually much branched from a hard and woody base, everywhere more or less clothed with white cottony tomentum. Leaves 2–6 in. long, linear-elongate or linear-lanceolate, acuminate, lower sometimes petiolate, upper sessile, with or without small auricles at the base, entire or with a few distant teeth; margins revolute. Corymbs terminal, broad, lax. Heads $\frac{1}{3}$ in. long, involucral bracts 12–14, narrow linear-lanceolate, acuminate, glabrous or cottony, usually with a few minute ones at the base. Florets about 30, females the more numerous. Achenes linear-oblong, grooved and angled, hairy, abruptly contracted towards the tip, crowned by a callous ring.—*Hook. f. Fl. Nov. Zel.* i. 142; *Handb. N.Z. Fl.* 157; *Benth. Fl. Austral.* iii. 660; *Kirk, Students' Fl.* 334. *Senecio quadridentatus*, *Labill. Pl. Nov. Holl.* ii. 48, t. 194; *A. Cunn. Precur.* n. 461; *Raoul, Choix*, 45.

NORTH AND SOUTH ISLANDS, CHATHAM ISLAND: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 3500 ft. November–January. Also in Australia and Tasmania.

5. *E. diversifolia*, *Petrie in Trans. N.Z. Inst.* xix. (1887) 324. —A slender erect annual herb 1–2½ ft. high. Stems grooved, glabrous or slightly cottony, simple or branched above. Leaves erect, 2–4 in. long; lower oblong or linear-oblong, narrowed into long petioles, obtuse, rather membranous, glabrous above, often puberulous beneath, entire or remotely and minutely denticulate; upper narrower, linear or linear-lanceolate, acute, sessile or nearly so, not auricled, glabrous or slightly cottony. Corymbs laxly and irregularly branched; pedicels slender, bracteate. Heads ¼ in. long; involucre bracts 12–14, linear-lanceolate, acute. Florets 30–40; females much the most numerous. Achenes linear-oblong, grooved, hispid, crowned with a callous ring.—*Kirk, Students' Fl.* 335.

NORTH ISLAND: Swamps at Karioi, base of Ruapehu, *Petrie!* SOUTH ISLAND: Canterbury—Broken River Basin and Mount Cook, *T. F. C.* Otago—Common in the interior, *Petrie!* Bluff Hill, *Enys.* STEWART ISLAND: *Kirk.* Sea-level to 3000 ft. December–January.

Best distinguished by the almost glabrous habit and erect nearly entire membranous leaves.

6. *E. glabrescens*, *T. Kirk in Trans. N.Z. Inst.* ix. (1878) 550. —A slender erect annual 1–3 ft. high; stem grooved, simple or branched above, glabrous or nearly so. Leaves very variable in size and shape, 3–6 in. long, oblong or lanceolate-oblong, deeply pinnatifid with the segments irregularly sinuate-dentate, or pinnate with a large terminal leaflet and few or many much smaller lateral ones, lower petiolate, upper sessile with broad toothed auricles, membranous, often purple beneath, glabrous or nearly so. Corymbs lax. Heads ½ in. long; involucre bracts 10–12, linear, acuminate, green with white margins. Florets 20–30; females the most numerous. Achenes longer than any other New Zealand species, ⅛–¼ in. long, pale, linear, glabrous, obscurely grooved, attenuated above, crowned with a callous ring.—*Students' Fl.* 335.

NORTH ISLAND: Erewhon, Upper Rangitikei, *Petrie!* SOUTH ISLAND, STEWART ISLAND: Not uncommon in mountain districts throughout. Ascends to 4500 ft., descends to sea-level in Stewart Island. January–February.

20. *BRACHYGLOTTIS*, Forst.

Shrubs or small trees. Branches stout, spreading, densely clothed with white tomentum, as are the leaves beneath and branches of the inflorescence. Leaves large, irregularly lobed or sinuate. Heads small, very numerous, crowded in large much-branched terminal panicles, heterogamous, obscurely radiate. Involucre narrow; bracts in 1 series, linear, scarious, shining, usually with minute subulate scales at the base. Receptacle small, foveolate. Florets of the circumference female, irregularly lobed or

2-lipped; outer lobe or ligule broad, inner small, narrow, revolute. Disc-florets hermaphrodite, tubular with a campanulate 5-toothed mouth. Anthers obtuse at the base, entire. Style-branches of the hermaphrodite florets truncate, papillose at the tips. Achenes terete or obscurely angled, papillose. Pappus-hairs copious, in 1 series.

A small genus of two (or more probably one) species, confined to New Zealand. It differs from *Senecio* in habit, in the shape of the female corolla, and in the papillose achenes.

Leaves dull. Involucres whitish, shining 1. *B. repanda*.
Leaves larger, glossy. Involucres purplish, hardly shining 2. *B. Rangiora*.

1. ***B. repanda***, *Forst. Char. Gen.* 46, t. 40.—A shrub or small tree 8–20 ft. high; branches stout, brittle, densely clothed with soft white tomentum. Leaves 4–12 in. long including the petiole, broadly oblong or ovate-oblong, irregularly lobed or sinuate, membranous, dull-green and glabrous above, clothed with milk-white tomentum beneath; petiole stout, 1–3 in. long. Panicles large, exceeding the leaves, often drooping. Heads small, $\frac{1}{8}$ in. long; bracts linear-oblong, whitish, shining. Florets 10–12; female florets with the outer lip lobed or entire.—*A. Cunn. Precur.* n. 463; *Hook. f. Eandb. N.Z. Fl.* 163; *Kirk, Students' Fl.* 336. *Senecio Forsteri*, *Hook. f. Fl. Nov. Zel.* i. 148, t. 40. *Cineraria repanda*, *Forst. Prodr.* n. 295; *A. Rich. Fl. Nouv. Zel.* 255.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape as far south as Kaikoura and Greymouth. Sea-level to 2500 ft. *Pukapuka; Wharangi-tavhito.* August–October.

A common plant in the northern portion of the colony. It is said to be poisonous to cattle and horses.

2. ***B. Rangiora***, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 357.—Very similar to the preceding, but rather smaller, seldom more than 12 or 14 ft. high, with stouter branches and larger leaves. Leaves 6–15 in. long including the petiole, more coriaceous and glossy, sometimes unequal at the base; petiole longer and stouter, 3–5 in. long. Involucral bracts purplish, hardly shining. Female florets with the outer ligule entire.—*Kirk, Students' Fl.* 336.

NORTH AND SOUTH ISLANDS: Shores of Cook Strait, *Buchanan! Kirk; Westport, Dr. Gaze! Greymouth, Helms! Rangiora.* July–September.

I consider this to be a trivial variety of *B. repanda*, from which it differs in no important character. But as both Kirk and Buchanan treated it as a distinct species, and as they were supported by the late Dr. Mantell, who had it in cultivation for many years, I have retained it for the present. It appears to keep its characters, such as they are, under cultivation.

21. **SENECIO**, Linn.

Herbs, shrubs, or small trees of exceedingly various habit, glabrous or pubescent or more or less woolly or tomentose. Leaves alternate, entire or variously divided. Heads solitary or corymbose or paniculate, heterogamous and radiate or homogamous and discoid. Involucre from cylindrical to hemispherical; bracts in 1 or 2 series, nearly equal, erect, free or connate below, usually with a few much shorter ones at the base. Receptacle flat or convex, naked, pitted or fimbriate. Florets of the circumference female, ligulate, sometimes sterile or wanting. Disc-florets hermaphrodite, tubular, 5-toothed. Anthers obtuse at the base or minutely tailed. Style-branches of the hermaphrodite florets recurved, their tips truncate or penicillate. Achenes subterete, usually ribbed or striate. Pappus-hairs copious, soft, white, smooth or scabrid or barbellate.

The largest genus of *Compositæ*, if not of flowering plants generally, probably containing fully 1,000 species. It is found in all parts of the world, stretching from the equator to the limits of phænogamic vegetation in both the arctic and antarctic regions, but is most abundant in temperate and mountainous districts. Few of the species have wide ranges, and many have a very restricted distribution. Of the 30 found in New Zealand, one extends to Australia, the rest are all endemic. The herbaceous species are exceedingly variable, and some of them difficult to determine; but the shrubby varieties are remarkably distinct. Some of them, such as *S. Hectori* and *S. Kirkii*, must be ranked amongst the most beautiful members of the flora.

A. Perennial or rarely annual herbs.

* Herbs with broad radical leaves and naked simple or branched scapes. Involucral bracts in 2 series.

- | | |
|---|------------------------------|
| Leaves 1-6 in., broadly oblong, cordate at the base, rugose and bristly above, white and tomentose beneath. Scape glandular-tomentose | 1. <i>S. lagopus</i> . |
| Leaves $\frac{3}{4}$ -4 in., broadly oblong to linear-oblong, narrowed at the base, rugose and bristly above, glabrate beneath. Scape cottony | 2. <i>S. bellidioides</i> . |
| Leaves 2-6 in., broadly oblong, both surfaces clothed with snow-white tomentum | 3. <i>S. Haastii</i> . |
| Leaves 3-6 in., broadly oblong or orbicular-oblong, upper surface silky or villous, not bristly, under-surface white and tomentose | 4. <i>S. saxifragoides</i> . |

** Herb with an erect leafy stem, corymbose above. Involucral bracts in 2 series.

- | | |
|---|------------------------|
| Leaves 2-10 in., linear. Heads large, with long spreading rays.. .. . | 5. <i>S. Lyallii</i> . |
|---|------------------------|

*** Herbs with branched leafy stems. Heads corymbose. Involucral bracts in 1 series.

- | | |
|--|--------------------------|
| Stems stout, fistulose, 1-2 ft. Leaves 2-5 in., deeply pinnatifid, rather fleshy, mealy-tomentose beneath. Heads corymbose, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., rays wanting .. | 6. <i>S. antipodum</i> . |
|--|--------------------------|

- Glabrous or pubescent. Stems stout or slender, 1-2 ft.
 Leaves 1-2 in., toothed or lobed or pinnatifid, rather
 fleshy. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., rays usually present .. 7. *S. laetus*.
 Everywhere glaucous. Stems numerous, 1-3 ft. Leaves
 2-4 in., obovate-spathulate, sinuate-toothed. Heads
 $\frac{1}{2}$ - $\frac{1}{2}$ in. diam., radiate 8. *S. glaucophyllus*.
 Tall, erect, much branched, glabrous, 2-4 ft. high. Leaves
 2-8 in., ovate-oblong, membranous, toothed or lobed or
 pinnatifid. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in., radiate 9. *S. latifolius*.
 Tall, stout, erect, glabrous, 2-5 ft. Leaves 2-5 in., oblong
 or linear-oblong, coriaceous, often glaucous, sinuate-
 dentate. Heads $\frac{1}{2}$ - $\frac{1}{2}$ in., radiate 10. *S. Banksii*.
 Erect, branched, 1-2 ft., clothed with white cobwebby
 tomentum. Leaves 1-4 in., oblong-ovate to lanceolate,
 toothed or lobed or pinnatifid. Heads $\frac{1}{2}$ - $\frac{1}{2}$ in., radiate .. 11. *S. Colensoi*.

B. Shrubs or small trees.

* Heads radiate, rays white.

- Thinly tomentose. Leaves 6-12 in., oblong-lanceolate or
 oblong-ovate, acutely toothed, with a few small pinnæ
 at the base. Heads large, 1-2 in. diam. 12. *S. Hectori*.
 Perfectly glabrous. Leaves 2-5 in., lanceolate to broad-
 obovate, rather fleshy, entire or sinuate-dentate. Heads
 large, $\frac{1}{2}$ -2 in. diam. 13. *S. Kirkii*.
 Tomentose and glandular. Leaves 3-7 in., oblong-lanceo-
 late, coarsely dentate, white and silky beneath. Heads
 small, $\frac{1}{3}$ in. diam. 14. *S. myrianthos*.

** Heads radiate, rays yellow.

- Climbing; branches flexuose, slender. Leaves 1-2 in.,
 orbicular, toothed. Heads $\frac{1}{3}$ in. diam. 15. *S. sciadophilus*.
 Erect, bushy, 2-6 ft. Leaves 1-2 in., oblong, crenate-
 toothed. Heads $\frac{1}{3}$ in. diam. 16. *S. perdicioides*.
 Shrub or small tree, 6-20 ft. Leaves 2-4 in., elliptic-
 lanceolate or -oblong, entire, fulvous beneath. Heads
 $\frac{1}{2}$ - $\frac{3}{4}$ in.; rays broad. 17. *S. Huntii*.
 Shrub or small tree, 6-25 ft. Leaves 3-7 in., lanceolate or
 elliptic-lanceolate, entire, white beneath. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in.,
 rays narrow, contorted 18. *S. Stewartie*.
 Diffuse shrub, 1-4 ft. Leaves 1-3 in., elliptic-lanceolate,
 acute at both ends, entire, white beneath. Panicle
 narrow, lax. Heads few, $\frac{1}{4}$ in. diam. 19. *S. laxifolius*.
 Spreading shrub, 2-8 ft. Leaves $1\frac{1}{2}$ - $3\frac{1}{2}$ in., oblong-ovate,
 entire, softly cottony beneath. Corymb broad, dense.
 Heads numerous, $\frac{3}{4}$ -1 in. diam. 20. *S. Greyii*.
 Compact shrub 2-4 ft. Leaves $\frac{3}{4}$ - $1\frac{1}{2}$ in., oblong or obovate,
 obscurely crenulate, white beneath. Racemes few-
 flowered. Heads $\frac{3}{4}$ -1 in. diam. 21. *S. compactus*.
 Much-branched shrub 2-6 ft. Leaves $\frac{1}{2}$ - $1\frac{1}{2}$ in., narrow
 oblong-obovate, wrinkled and crenate, white beneath.
 Corymbs many-flowered. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. 22. *S. Monroi*.
 Small shrub $\frac{1}{2}$ - $1\frac{1}{2}$ ft. Leaves viscid, 1-2 $\frac{1}{2}$ in., oblong-
 lanceolate, flat. Corymb dense, leafy, tomentose. Heads
 $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. 23. *S. revolutus*.
 Robust much-branched shrub 3-5 ft. Leaves 1-2 in.,
 oblong, excessively viscid and coriaceous; margins
 recurved. Corymb lax, glabrous, viscid. Heads $\frac{3}{4}$ in.
 diam. 24. *S. Adamsii*.

- Much-branched shrub 1-2 ft. Leaves $1 \times \frac{1}{2}$ in., narrow-linear; margins revolute to the midrib. Head 1 in. diam., solitary on a leafy peduncle 25. *S. bifistulosus*.
 Closely branched shrub 4-10 ft. Leaves $\frac{1}{2}$ - $\frac{1}{4}$ in., linear-oblong. Head solitary, sessile, $\frac{1}{3}$ in. diam. 26. *S. cassinioides*.

*** Heads discoid; ray wanting.

- Branching shrub 4-10 ft. Leaves 2-6 in., obovate or oblong-lanceolate, tomentose beneath. Panicle large. Heads $\frac{1}{3}$ in. diam. 27. *S. elaeagnifolius*.
 Shrub or small tree 6-30 ft. Leaves 2-5 in., orbicular or nearly so. Panicles large. Heads $\frac{1}{3}$ in. diam. 28. *S. rotundifolius*.
 Small compact shrub 1-3 ft. Leaves $\frac{1}{2}$ -2 in., oblong, very coriaceous. Corymbs usually dense. Heads $\frac{1}{4}$ - $\frac{1}{3}$ in. diam. 29. *S. Bidwillii*.
 Slender glabrous shrub 1-4 ft.; young branchlets glutinous. Leaves $1\frac{1}{2}$ -3 in., obovate-spathulate, veined. Corymbs lax. Heads $\frac{1}{3}$ - $\frac{1}{2}$ in. diam. 30. *S. geminatus*.

S. Pottsi, Armstr. in Trans. N.Z. Inst. iv. (1872) 290, is quite unknown to me, and there are no specimens in any colonial herbaria. It is described as a small slender suffrutescent species with decumbent flexuose branches 3-6 in. long, the branches, petioles, and leaves beneath clothed with loose white cottony tomentum. Leaves petiolate, $\frac{1}{2}$ -1 in. long, ovate or spatulate, glabrous above, crenate. Heads solitary, $\frac{1}{3}$ in. long, on slender bracteate peduncles; involucre bracts 15-20, linear, obtuse, cottony.—Mount Jollie, Rangitata district, alt. 4500 ft.

S. dimorphocarpos, Col. in Trans. N.Z. Inst. xxvi. (1894) 316, is *S. jacobæa*, Linn., the common ragwort of the Northern Hemisphere, which has become naturalised in many districts in both the North and South Islands. It is a tall almost glabrous perennial 2-4 ft. high, with irregularly pinnatifid or 2-pinnatifid leaves 2-6 in. long, a dense corymb of rather large heads $\frac{3}{4}$ -1 in. diam., bright-yellow rays, and glabrous ribbed achenes.

S. areolatus, Col. l.c. 317, is *S. sylvaticus*, Linn., another common northern plant which has become established in New Zealand. An annual slightly glandular-pubescent herb 1-3 ft. high, with irregularly pinnatifid leaves 1-3 in. long, loose corymbs of small heads $\frac{1}{3}$ in. diam., with very short revolute rays and silky ribbed achenes.

Several other species of *Senecio* have become naturalised, the most widely distributed being *S. vulgaris*, Linn., the common groundsel, which can be recognised by its small size, 6-12 in. high, succulent grooved stems often branched from the base, irregularly pinnatifid or toothed leaves, small cylindric heads with the florets all tubular and hermaphrodite, and an involucre of about 20 equal bracts.

1. *S. lagopus*, Raoul in Ann. Sci. Nat. Ser. iii. 2 (1844) 119, t. 18.—Rootstock stout, densely clothed at the top with long brownish silky wool. Leaves all radical, crowded, spreading; blade 1-5 in. long, broadly oblong, rounded at the tip, usually cordate at the base, margins entire or crenulate, upper surface rugose, covered with short stiff bristles, beneath densely clothed with white tomentum; petioles $\frac{1}{2}$ -4 in. long, stout or slender, densely villous. Peduncles or scapes 1-12 in. high, simple or much branched, pubescent and glandular-pilose; bracts few, small, obtuse. Heads 1 to many,

$\frac{1}{2}$ –1 in. diam., yellow; involucre bracts glandular and tomentose. Rays $\frac{1}{4}$ – $\frac{1}{2}$ in. long, spreading. Achenes linear, glabrous.—*Choix*, 21, t. 17; *Hook. f. Fl. Nov. Zel.* i. 143; *Handb. N.Z. Fl.* 158; *Kirk, Students' Fl.* 338.

NORTH AND SOUTH ISLANDS: Not uncommon from Taupo and the Ruahine Mountains to the south of Canterbury. Sea-level to 4500 ft. November–January.

2. *S. bellidioides*, *Hook. f. Fl. Nov. Zel.* i. 144.—Very similar to *S. lagopus*, but smaller and more slender. Leaves all radical, spreading; blade $\frac{3}{4}$ –4 in. long, broadly oblong to linear-oblong, obtuse or subacute, rounded or slightly cordate at the base or narrowed into the petiole, membranous or subcoriaceous, entire or crenulate, upper surface rugose or almost flat, more or less covered with short stiff bristles, beneath glabrate or sparingly clothed with white or brownish tomentum; petioles long or short, usually woolly. Scapes 1–12 in. high, simple or branched, cottony or glandular-pubescent, rarely glabrate; bracts few, small, acute. Heads 1 to many, $\frac{1}{2}$ –1 in. diam.; involucre bracts tomentose or glabrate. Achenes linear, glabrous.—*Handb. N.Z. Fl.* 159; *Kirk, Students' Fl.* 338. *S. Traversii*, *F. Muell. in Trans. Bot. Soc. Edinb.* vii. (1861) 154.

Var. *glabratus*, *Kirk, l.c.*—Leaves broadly oblong, glabrous beneath, sparingly setose above.

Var. *angustatus*, *Kirk, l.c.*—Leaves linear-oblong, apex rounded or subacute.

SOUTH ISLAND, STEWART ISLAND: Not uncommon in mountain districts throughout. 2000–5000 ft. December–February.

This appears to pass into *S. lagopus*, but in its usual state can generally be distinguished by the smaller size and more membranous leaves, which are often quite glabrous beneath, seldom white and cottony.

3. *S. Haastii*, *Hook. f. Handb. N.Z. Fl.* 159.—Rootstock stout or slender, more or less clothed at the top with soft whitish wool. Leaves all radical; blade 2–5 in. long, broadly oblong or orbicular-oblong, obtuse at the tip, rounded or slightly cordate at the base, subcoriaceous, obscurely crenulate, both surfaces covered with soft white lax or appressed tomentum, or the upper surface hoary-tomentose or almost glabrate; petioles slender, 2–6 in. long, white and cottony. Scapes slender, 5–15 in. high, simple or branched, cottony and slightly glandular; pedicels long, slender; bracts few, linear or linear-obovate. Heads 1–8, $\frac{3}{4}$ –1 $\frac{1}{2}$ in. diam.; involucre bracts linear-oblong, subacute, white and cottony. Achenes narrow-linear, glabrous.—*Kirk, Students' Fl.* 339.

SOUTH ISLAND: Nelson—Clarence Valley, *T. F. C.* Canterbury—Broken River, *Enys!* *Kirk!* *T. F. C.*; Mount Cook district, *Haast!* *T. F. C.*; shores of Lake Ohau and source of the Ahuriri, *Haast.* Otago—Lake Hawea, *Haast!* not uncommon in the interior, *Hector* and *Buchanan!* *Petrie!* 1500–4000 ft. December–January.

4. *S. saxifragoides*, *Hook. f. Fl. Nov. Zel.* i. 144.—Rootstock short, stout, as thick as the thumb, densely shaggy with soft brownish wool. Leaves all radical, spreading; blade 3–6 in. long, broadly oblong or orbicular, obtuse at the tip, rounded or slightly cordate at the base, sometimes oblique, thick and coriaceous, entire or crenulate, upper surface silky or villous, not bristly, becoming glabrate when old; under-surface densely clothed with white woolly tomentum; petioles stout, 1–4 in. long, woolly or villous. Scapes stout, 2–12 in. high, simple or branched, densely covered with white or purplish glandular tomentum; bracts linear or linear-oblong. Heads 2–8, $\frac{3}{4}$ – $1\frac{1}{2}$ in. diam.; involucrel bracts linear, acute, thickly tomentose. Achenes linear, glabrous.—*Handb. N.Z. Fl.* 159; *Kirk, Students' Fl.* 339.

SOUTH ISLAND: Port Lyttelton and other localities on Banks Peninsula, not uncommon. January–March.

A handsome species, separated from large states of *S. lagopus*, some of which approach it very closely, by the much stouter habit, more copious villous hairs, and larger thicker leaves, which are silky above and never show the stout bristly hairs so characteristic of *S. lagopus* and *bellidioides*.

5. *S. Lyallii*, *Hook. f. Fl. Nov. Zel.* i. 146.—A leafy herb 1–2 ft. high or more, usually glandular-pubescent or almost villous, rarely glabrate. Rootstock thick, crowned with long silky hairs. Stem stout or slender, simple, erect, terminating in a broad corymb of many flower-heads. Leaves numerous, quite entire; lower 2–10 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, linear or narrow-linear, acute or acuminate, contracted or petiolate above the sheathing villous base, 1–5-nerved; cauline gradually becoming smaller, sessile, amplexicaul, tapering from the base to the apex. Corymbs usually large and broad; peduncles 1–5 in. long, slender, simple, bracteate. Heads large, 1–2½ in. diam.; involucrel bracts in 1 series, linear, pubescent or glabrate. Ray-florets $\frac{1}{2}$ –1 in. long, yellow, spreading. Achenes linear, silky, ribbed. Pappus-hairs unequal, rigid, scabrid.—*Handb. N.Z. Fl.* 160; *Kirk, Students' Fl.* 339.

Var. *scorzonerioides*, *Kirk, l.c.* 340.—Glandular-pubescent. Stems more robust. Leaves shorter and broader, 2–8 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, linear-lanceolate or lanceolate or oblong-lanceolate, acute, 5-nerved. Heads larger; rays varying in colour from yellow or salmon-coloured to pure white.—*S. scorzonerioides*, *Hook. f. Fl. Nov. Zel.* i. 146.

SOUTH ISLAND, STEWART ISLAND: Not uncommon in mountain districts throughout. Descends to sea-level in Stewart Island, ascends to quite 5000 ft. in Nelson and Canterbury. December–February.

An exceedingly handsome plant, forming one of the chief ornaments of the subalpine flora of the South Island.

6. *S. antipodus*, *T. Kirk, Students' Fl.* 341.—An erect much-branched annual or biennial herb 1–2 ft. high; stems stout, fistulose, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; branches spreading, grooved. Leaves

membranous, rather succulent, 2-5 in. long, lower narrowed into a petiole, upper sessile with broad amplexicaul auricles, deeply and irregularly pinnatifid; segments few, 1-2 in. long, acute, toothed or lobed or almost pinnatifid, glabrous above, mealy-tomentose beneath. Corymbs terminal; peduncles slender, bracteate. Heads numerous, discoid, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam.; involucre broad, campanulate; bracts about 20, in 1 series, linear-lanceolate, acute, 2-ribbed, margins scarious. Florets all hermaphrodite, very numerous, funnel-shaped. Achenes linear-oblong, grooved, glabrous or minutely puberulous.

ANTIPODES ISLAND: Kirk! January-February.

A very distinct species, quite unlike any other found in New Zealand. Kirk compares it with the Fuegian *S. candidans*, but that has ovate leaves with crenate-toothed margins.

7. *S. lautus*, Forst. Prodr. n. 538.—An exceedingly variable much or sparingly branched glabrous or pubescent annual or biennial herb 6-24 in. high; stems stout or slender, erect or decumbent or almost prostrate, grooved, flexuose. Leaves 1-2 in. long, linear or linear-lanceolate, more rarely broader and lanceolate or linear-oblong to oblong, either narrowed into a petiole or dilated with stem-clasping auricles at the base, entire or remotely toothed or lobed or pinnatifid; lobes narrow or broad. Heads in few- or many-flowered corymbs, $\frac{1}{3}$ - $\frac{3}{4}$ in. diam., campanulate; involucre bracts herbaceous, linear, acute, pubescent at the tips, usually prominently 2-ribbed; outer bracts few, small. Ray-florets 10-15, with spreading or revolute ligules, rarely absent. Disc-florets numerous, scarcely longer than the involucre. Achenes linear, grooved, pubescent or nearly glabrous. Pappus-hairs copious, soft, white.—*A. Rich. Fl. Nouv. Zel.* 257; *A. Cunn. Precur.* n. 457; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 145; *Handb. N.Z. Fl.* 160; *Benth. Fl. Austral.* iii. 667; *Kirk, Students' Fl.* 341. *S. neglectus*, *A. Rich. l.c.* 258. *S. angustifolius*, Forst. Prodr. n. 539.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLAND: Abundant near the sea, not so common inland. Sea-level to 4500 ft. October-March.

This is a widely diffused plant in Australia and Tasmania as well as New Zealand, and is everywhere exceedingly variable, not a few forms having been described as distinct species. The chief varieties found in New Zealand may be briefly characterized as follows, but it must be borne in mind that intermediates are not uncommon:—

Var. *a.*—Much branched, erect or decumbent. Leaves deeply pinnatifid; segments long and narrow, often again toothed, rarely short and broad. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., radiate.—Usually near the coast, but occasionally found inland. Mr. Kirk's variety *carosulus* is probably a form of this.

Var. *montanus*.—Sparingly branched or quite simple, erect. Leaves oblong to lanceolate or spatulate, entire or toothed or shortly pinnatifid. Heads $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., radiate; rays often revolute.—A common mountain plant in both the North and South Islands.

Var. **discoideus**.—Sparingly branched, prostrate or decumbent, rarely erect. Leaves very fleshy, obovate or spathulate, coarsely toothed or lobed, sometimes pinnatifid below. Heads large, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; rays wanting.—Mountain districts in the South Island.

Var. **radiolatus**, *Kirk, Students' Fl.* 341.—More or less pubescent. Lower leaves broad, membranous, narrowed into slender petioles, toothed or lobed or pinnatifid; upper sessile, auricled at the base. Heads $\frac{1}{3}$ – $\frac{1}{2}$ in., radiate; rays short, broad. Achenes very mucilaginous when soaked in warm water.—*S. radiolatus*, *F. Muell. Veg. Chath. Is.* 24, t. 4. Chatham Islands, *H. H. Travers!* *Cox and Cockayne!*

8. **S. glaucophyllus**, *Cheesem. in Trans. N.Z. Inst.* xxviii. (1896) 536.—Smooth and glaucous, perfectly glabrous, 1–3 ft. high. Rootstock stout, woody. Stems numerous, strongly grooved, simple or sparingly branched, naked at the base or with minute scale-like leaves only, leafy above. Leaves 2–4 in. long, $\frac{1}{2}$ –1 in. wide, oblanceolate or oblong-obovate or obovate-spathulate, obtuse or subacute, gradually narrowed into broad flat petioles, not dilated nor sheathing at the base, irregularly sinuate-dentate or serrate, rather thin, very glaucous; margins somewhat thickened. Upper leaves narrower, lanceolate or linear-lanceolate, serrate, gradually passing into narrow-linear entire bracts. Heads several in a loose terminal corymb, broadly campanulate, $\frac{1}{3}$ in. diam.; involucre bracts linear, acuminate, 2-ribbed, glabrous or pilose at the tips. Ray-florets about 15; disc-florets numerous. Achenes not seen.—*Kirk, Students' Fl.* 343.

SOUTH ISLAND: Nelson—Mount Arthur, on limestone rocks, alt. 4000 ft., *T. F. C.* January.

A very curious plant, its bushy mode of growth and glaucous leaves giving it a very different appearance to any of its allies. The stems appear to die down to the root in winter, a fresh crop appearing in the following spring. My specimens are in young flower only, and the above description may require modification when more perfect examples have been obtained.

9. **S. latifolius**, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i. 145.—A tall erect much-branched glabrous herb 2–4 ft. high; stems flexuous, grooved. Leaves membranous, 2–8 in. long, very variable in shape; lower on long winged petioles with or without small toothed auricles at the base, blade broadly oblong or ovate-oblong to linear-oblong, toothed or lobulate or irregularly lyrate-pinnatifid; upper sessile, ovate-oblong to linear-oblong, coarsely toothed or lobed, often contracted below the middle and then expanding into broad toothed auricles; uppermost leaves linear-lanceolate, acute, serrate or dentate. Corymbs broad, lax, much branched; branches slender. Heads very numerous, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; involucre bracts in 1 series, linear, acuminate, glabrous or pubescent. Ray-florets 12–20; ligule narrow, spreading. Disc-florets 30–40. Achenes linear, grooved, hispidulous. Pappus-hairs soft, copious, white.—*Hook. f. Handb. N.Z. Fl.* 159; *Kirk, Students' Fl.* 341.

Var. *rufiglandulosus*, Kirk, l.c.—Glandular-pubescent or glabrate. Leaves coarsely and sharply irregularly doubly dentate or serrate, sometimes lobed at the base. Corymbs very large. Achenes densely pubescent.—*S. rufiglandulosus*, Col. in Trans. N.Z. Inst. xxviii. (1896) 599.

Var. *sinuatifolius*, Kirk, l.c.—Stems slender, flexuose. Leaves distant, ovate-oblong, sinuate, not toothed. Corymbs small; heads few.

NORTH ISLAND: From the Paparata Valley and Waikato River southwards, but rare and local to the north of the East Cape. SOUTH ISLAND: Western part of the Nelson Provincial District and Westland, not uncommon as far south as Ross. Sea-level to 3500 ft. November–February.

10. *S. Banksii*, Hook. f. *Fl. Nov. Zel.* i. 146.—An erect stout or slender perfectly glabrous branched herb 2–4 ft. high or more; stems flexuose, grooved. Leaves 2–5 in. long, 1–2 in. broad, broadly oblong or ovate-oblong to linear-oblong, acute or subacute, sessile with broad auricled amplexicaul bases, coriaceous or almost membranous, shining, often glaucous, coarsely and irregularly sinuate-serrate or dentate; veins reticulated, often prominent beneath; uppermost leaves smaller and narrower, lanceolate or linear. Corymbs broad, lax. Heads numerous, campanulate, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad; involucre bracts linear-oblong, acuminate, pubescent at the tips. Ray-florets 10–12; ligules short, revolute. Achenes linear, grooved, pubescent.—*Handb. N.Z. Fl.* 734; *Kirk, Students' Fl.* 342. *S. odoratus*, Hook. f. *Handb. N.Z. Fl.* 160 (not of Horne-mann). *S. pumiceus*, Col. in Trans. N.Z. Inst. xxi. (1889) 89; *Kirk, Students' Fl.* 343.

Var. *angustatus*.—Much less robust and more rigid, glabrous or sparingly clothed with short scabrid hairs. Leaves $1\frac{1}{2}$ –3 in. long, $\frac{1}{4}$ – $\frac{3}{8}$ in. broad, lanceolate or oblong-lanceolate, acute, all sessile or the lower sometimes petiolate, coriaceous, sharply and irregularly sinuate-serrate; veins usually prominent beneath.—*S. Banksii* var. *scabrosus*, Hook. f. *Fl. Nov. Zel.* i. 147. *S. pumiceus* var. *angustatus*, Kirk, *Students' Fl.* 343.

NORTH ISLAND: Mokohinou Island, *Herb. Col. Mus.*! Mercury Bay, *Banks* and *Solander*; East Cape Island, *Ross*; Anaura and Tolago Bay, *Banks* and *Solander*, *Adams* and *Petrie*! near Table Cape, *A. Hamilton*! between Tolago Bay and Gisborne, *Colenso*. Var. *angustatus*: East Cape, *A. Hamilton*; Karangahake Cliffs, Lake Taupo, *T. F. C.* Sea-level to 1500 ft. December–January.

Mr. Kirk limits *S. Banksii* to a form with more decidedly flexuous stems and rather membranous glaucous leaves, keeping up *Colenso's S. pumiceus* for the reception of those states with stouter and straighter stems and more coriaceous leaves. But a series of the Tolago Bay plant, which is that collected by *Banks* and *Solander*, shows that this distinction cannot possibly be maintained, some of the specimens exactly matching the types of *S. pumiceus* in Mr. *Colenso's* herbarium, while others show a regular gradation to more slender and membranous forms. An examination of the ripe achenes of both varieties also proves that the supposed difference in size and shape does not exist.

11. *S. Colensoi*, Hook. f. *Fl. Nov. Zel.* i. 147.—An erect much or sparingly branched herb 10–20 in. high, more or less clothed with white cobwebby tomentum. Stems woody at the base,

flexuose, grooved. Leaves very variable, 1-4 in. long, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. broad, broadly oblong or obovate to lanceolate, obtuse or acute, sessile with broad amplexicaul bases or petiolate with auricles at the base of the petioles, coriaceous; margins sinuate-dentate or serrate or deeply irregularly lobulate or pinnatifid, hoary or cobwebby on both surfaces or on the lower surface only. Corymbs terminal, usually lax. Heads few or many, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., campanulate; involucre bracts linear-oblong, acute or acuminate. Rays short, revolute. Achenes slender, grooved, silky or hispid.—*Handb. N.Z. Fl.* 160; *Kirk, Students' Fl.* 342.

NORTH ISLAND: Usually on cliffs near the sea. Bay of Islands, *Colenso*; East Cape, *Colenso*; Napier, *Bishop Williams*! A. Hamilton! Cape Kidnappers, *Colenso*, *Kirk*! Waipawa, *Petrie*! Patangata, *Tryon*! November-January.

12. *S. Hectori*, *Buch. in Trans. N.Z. Inst.* v. (1873) 348; vi. t. 23.—An erect branching shrub 6-12 ft. high; branches, stout, spreading, tomentose. Leaves crowded near the tips of the branches, 6-12 in. long, 2-4 in. broad, oblong-lanceolate or elliptic-lanceolate or narrow oblong-ovate, acute, narrowed to the base, membranous, scaberulous above, thinly clothed with white cottony tomentum beneath, acutely toothed, pinnatifid or pinnate for a short distance at the very base; petiole very short. Corymbs large, lax, terminal, much branched, often 1 ft. or more across; peduncles and pedicels clothed with short stiff glandular pubescence. Heads large, 1-2 in. diam., broadly campanulate; involucre bracts in 2 series, outer lanceolate, inner broader and oblong-lanceolate, acute; margins broad, membranous. Ray-florets 8-12; ligules broad, spreading, white. Disc-florets numerous. Achenes linear, grooved, glabrous. Pappus-hairs rigid, scabrid.—*Kirk, Students' Fl.* 344.

SOUTH ISLAND: Nelson—Collingwood, *Hector*, *Travers*; between Takaka and Riwaka, *Kirk*; sources of the Takaka, Upper Motueka and its tributaries, *T. F. C.*; Upper Buller Valley, *McGregor*, *Hector*! *Kirk*! Westland—Valley of the Grey, *Kirk*. 250 to 3500 ft. December-February.

One of the finest species of the genus, well marked off from any other by a small portion of the very base of the leaf being pinnatifid or pinnate, all the remainder being dentate. The heads are sometimes as much as 2 $\frac{1}{2}$ in. diam.

13. *S. Kirkii*, *Hook. f. ex T. Kirk, Students' Fl.* 344.—An erect perfectly smooth and glabrous branching shrub 6-12 ft. high; branches stout, brittle. Leaves very variable in size and shape, 2-5 in. long, $\frac{1}{3}$ -2 in. broad, lanceolate or obovate-lanceolate to oblong-ovate or rhomboid-ovate, acute or obtuse, entire or sinuate-dentate, rather fleshy, narrowed into a short slender petiole or cuneate at the base. Corymbs large, often much branched, 4-12 in. diam. or more; branches spreading; lower bracts foliaceous. Heads numerous, large, campanulate, 1 $\frac{1}{2}$ -2 in. diam.; involucre bracts in 2 series, linear-oblong, acute, margins membranous. Ray-florets few; ligules

long, white, spreading, $\frac{3}{4}$ –1 in. long. Disc-florets with a campanulate 5-toothed limb. Achenes linear, grooved, glabrous, slightly expanded and thickened at the tip. Pappus-hairs rigid, scabrid.—*S. glastifolius*, *Hook. f. Fl. Nov. Zel.* i. 147, t. 39; *Handb. N.Z. Fl.* 161 (not of *Linn. f.*). *Solidago arborescens*, *A. Cunn. Prodr. n.* 435 (not of *Forst.*).

NORTH ISLAND : Common in hilly and wooded districts from the North Cape to Wellington. Sea-level to 2500 ft.

A very remarkable and beautiful species. The flower-heads are often so abundantly produced as to conceal the leaves, the multitude of snow-white rays then rendering the plant conspicuous from afar. In the northern forests it is often epiphytic on the distorted trunks of the rata (*Metrosideros robusta*).

14. **S. myrianthos**, *Cheesem. in Trans. N.Z. Inst.* vii. (1875) 348.—A small sparingly branched shrub 3–12 ft. high; bark black; branches slender, when young clothed with thin buff tomentum. Leaves 3–7 in. long, oblong-lanceolate or elliptic-lanceolate, acute or acuminate, usually unequal and often slightly cordate at the base, sharply and coarsely doubly dentate, thin and membranous, glabrous above when mature, beneath clothed with silvery-white appressed tomentum, veins reticulated; petioles slender, 1–2 in. long. Panicles large, terminal, often more than 2 ft. long; peduncles and pedicels slender, everywhere densely covered with short spreading purplish-brown glandular hairs; lower bracts often foliaceous, upper subulate. Heads numerous, $\frac{1}{3}$ in. long, obconic; involucre bracts about 8, linear-oblong, obtuse, membranous, glabrous or nearly so. Ray-florets 4–6, white; ligules very short and broad, $\frac{1}{8}$ in. long. Disc-florets about 6; limb narrow-campanulate, 5-toothed. Achenes oblong, grooved, minutely hispidulous. Pappus-hairs in 1 series, minutely scabrid.—*Kirk, Students' Fl.* 346. *S. Cheesemanii*, *Hook. f. in Ic. Plant.* t. 1201.

NORTH ISLAND : Ravines on the Cape Colville Peninsula, from Coromandel to Tairua and Waitekauri, *T. F. C., Adams!* Sea-level to 750 ft. November–December.

A handsome and distinct species, well characterized by the membranous leaves, large elongated panicles, and small white ray-florets. The flowers are deliciously sweet-scented.

15. **S. sciadophilus**, *Raoul in Ann. Sci. Nat.* Ser. iii. 2 (1844) 119.—A slender climbing shrub 3–15 ft. high; branches flexuose, often pendent, striate, clothed with short pubescence. Leaves distant, spreading, 1–2 in. long; blade about half the length, orbicular or orbicular-ovate, coarsely toothed, membranous, clothed on both surfaces with short scattered hairs or glabrate; veins reticulated. Heads $\frac{1}{3}$ in. diam., in few-flowered axillary or terminal corymbs, often forming an elongated terminal panicle; pedicels slender, pubescent. Involucre campanulate; bracts few, 6–8, linear-oblong, subacute; margins scarious. Ray-florets 4–7; ligule

$\frac{1}{5}$ in. long, yellow, revolute. Disc-florets 6-10; limb broadly campanulate, deeply 5-lobed. Achenes grooved, glabrous or sparingly hispidulous. Pappus-hairs in several series, rigid, minutely denticulate.—*Choix*, 21, t. 18; *Hook. f. Fl. Nov. Zel.* i. 150; *Handb. N.Z. Fl.* 161; *Kirk, Students' Fl.* 345.

SOUTH ISLAND: Nelson—Riwaka, *Rev. F. H. Spencer*; Wairoa Gorge, *Bryant*. Canterbury—Akaroa, *Raoul*; Alford Forest, *J. D. Enys*; Peel Forest, *W. Barker*. Otago—Not uncommon in the vicinity of Dunedin, *G. M. Thomson*; *Petrie*! Sea-level to 2000 ft. January–April.

16. **S. perdicioides**, *Hook. f. Fl. Nov. Zel.* i. 149.—A small round-topped branching shrub 2-6 ft. high; branches slender, grooved, pubescent, scarred where the leaves have fallen away. Leaves 1-2 in. long, oblong or elliptic-oblong to ovate-oblong, obtuse, membranous, crenate-serrate or dentate, quite glabrous; veins reticulated; petioles slender. Corymbs leafy, terminating the branches; pedicels slender, pubescent. Heads turbinate, $\frac{1}{5}$ in. long; involucre bracts about 5, oblong, obtuse, with broad scarious margins. Ray-florets 2 or 3, rarely more, yellow; ligule oblong, spreading. Disc-florets 4-8; limb funnel-shaped, deeply 5-lobed. Achenes oblong, grooved, glabrous or nearly so. Pappus-hairs in 2 series, rigid, minutely scabrid.—*Handb. N.Z. Fl.* 161; *Kirk, Students' Fl.* 345. *S. multinerve*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 330. *S. distinctus*, *Col. l.c.* xxvii. (1895) 390.

NORTH ISLAND: From Hicks Bay and the East Cape to Mahia Peninsula; not uncommon. *Raukumara*. November–January.

17. **S. Huntii**, *F. Muell. Veg. Chath. Is.* 23, t. 3.—A shrub or small round-headed tree 6-20 ft. high, usually more or less glandular-pubescent and viscid in all its parts; branchlets marked with the scars of the fallen leaves. Leaves crowded, 2-4 in. long, elliptic-lanceolate or elliptic-oblong to linear-obovate, obtuse or acute, narrowed to a sessile base, entire, glabrous or nearly so above, usually clothed with thin fulvous tomentum beneath; margins flat or subrevolute; midrib prominent beneath. Panicle terminal, large, dense, much branched, 3-5 in. broad; pedicels slender, densely glandular-hirsute. Heads $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; involucre bracts about 12, linear-oblong, obtuse or acute, membranous, glandular, villous at the tips. Ray-florets 15-20, yellow; ligule broad, revolute. Disc-florets numerous; limb campanulate, 5-lobed. Achenes oblong, grooved, glabrous. Pappus-hairs in 2 series, slender, scabrid.—*Hock. f. Handb. N.Z. Fl.* 734; *Kirk, Students' Fl.* 346.

CHATHAM ISLANDS: Not uncommon, *H. H. Travers*, *Mair*; *Cox*; *Cockayne*; *Rautini*. December–February.

18. **S. Stewartiæ**, *Armst. in Trans. N.Z. Inst.* xiii. (1881) 339.—A shrub or small tree 6-25 ft. high; trunk 8-24 in. diam.; branches spreading, marked with the scars of the fallen leaves. Leaves

crowded at the ends of the branches, 3-7 in. long, lanceolate or elliptic-lanceolate, acute or acuminate, narrowed to a broad sessile base, quite entire, subcoriaceous, glabrous above, clothed with thin appressed white tomentum beneath; veins reticulated. Panicles terminal, erect, 4-9 in. long; peduncles and pedicels densely glandular-pubescent, lower bracts foliaceous. Heads numerous, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam.; involucre bracts about 12, linear-oblong, obtuse, glandular-pubescent. Ray-florets 12-15, yellow; ligules narrow, contorted. Disc-florets 20-30; limb campanulate, 5-lobed. Achenes oblong, grooved, glabrous. Pappus-hairs dirty-white, short, scabrid.—*S. Muellieri*, *Kirk in Trans. N.Z. Inst.* xv. (1883) 360; *Students' Fl.* 346.

HEREKOPERE ISLAND (in Foveaux Strait): *C. Traill, Kirk!* THE SNARES: *Kirk!* December-January.

This is clearly identical with Armstrong's *S. Stewartiæ*, a name which has two years' priority over the *S. Muellieri* of Kirk. It is very closely allied to the preceding species, but the leaves are more acuminate, and the tomentum of the under-surface is whiter, while the narrow contorted rays are quite unlike the short broad ones of *S. Huntii*.

19. *S. laxifolius*, *Buch. in Trans. N.Z. Inst.* ii. (1870) 89.—A small diffusely branched shrub 1-4 ft. high; branchlets, leaves beneath, and inflorescence densely clothed with white cottony tomentum. Leaves usually close-set, on slender petioles $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long; blade 1-2 $\frac{1}{2}$ in., lanceolate or oblong-lanceolate or elliptic-lanceolate, acute at both ends, glabrous above or slightly cottony when young, coriaceous, quite entire. Panicle terminal, long and narrow, lax; peduncles and pedicels slender, cottony; lower bracts foliaceous. Heads $\frac{3}{4}$ in. diam., broad-campanulate; involucre bracts 12-15, linear-oblong, acute, tomentose, with broad scarious margins. Ray-florets 12-15, long and narrow, yellow. Disc-florets numerous. Achenes oblong, grooved, glabrous.—*Kirk, Students' Fl.* 347.

SOUTH ISLAND: Nelson—Mount Arthur and Mount Owen, *T. F. C.*; Wairau Gorge, *Bryant, T. F. C.*; Spencer Mountains, *Gibbs*; Discovery Peaks, *Travers!* Fowler's Pass, *Kirk!* 2500-3000 ft. December-February.

20. *S. Greyii*, *Hook. f. Fl. Nov. Zel.* i. 148, t. 38.—A small spreading shrub 2-8 ft. high; branches stout, woody, terete; branchlets, under-surface of leaves, and petioles densely clothed with appressed soft white tomentum. Leaves on slender petioles $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long; blade 1 $\frac{1}{2}$ -3 $\frac{1}{2}$ in., oblong or oblong-ovate, obtuse, rounded and often unequal at the base, coriaceous, quite entire, upper surface glabrous except a cottony line at the margin; midrib prominent beneath. Corymbs large, terminal, 2-5 in. broad, much branched; peduncles and pedicels glandular-pubescent; bracts numerous, the lower ones foliaceous; the upper narrower, lanceo-

late or linear. Heads campanulate, $\frac{3}{4}$ –1 in. diam.; involucre bracts about 15, linear or linear-oblong, membranous, acute, glandular-pubescent. Ray-florets 12–15, yellow; ligules spreading, $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Disc-florets numerous; limb campanulate, 5-lobed. Achenes linear, densely silky. Pappus-hairs in several series, white, rigid, scabrid.—*Handb. N.Z. Fl.* 161; *Kirk, Students' Fl.* 347.

NORTH ISLAND: Wellington—From the Pahau River to Cape Palliser; rare and local. Sea-level to 1500 ft.

A handsome species, nearest to *S. laxifolius*, but at once separated by the larger obtuse leaves, dense corymbs, glandular-pubescent involucre bracts, and silky achenes.

21. **S. compactus**, *T. Kirk in Trans. N.Z. Inst.* xii. (1880) 395.—A small much-branched compact shrub 2–3 ft. high and 3–6 ft. diam.; branches, petioles, leaves beneath, and inflorescence densely clothed with appressed snow-white tomentum. Leaves on slender petioles $\frac{1}{4}$ – $\frac{1}{2}$ in. long; blade $\frac{3}{4}$ –1 $\frac{1}{2}$ in., obovate or oblong-obovate, obtuse, rounded or narrowed at the base, coriaceous, glabrous above except a cottony line at the margin, obscurely crenulate or sinuate. Heads broadly campanulate, $\frac{3}{4}$ –1 in. diam., in 4–8-flowered terminal leafy racemes; involucre bracts about 12, linear, acute, densely tomentose. Ray-florets about 12, yellow; ligules broad, spreading. Disc-florets very numerous; limb funnel-shaped, 5-toothed. Achenes linear, grooved, silky. Pappus-hairs white, minutely scabrid.—*Students' Fl.* 349.

NORTH ISLAND: Wellington—Limestone cliffs near Castlepoint, *Kirk*! January–February.

Closely allied to *S. Monroi*, but differing in the larger broader leaves with smoother and whiter tomentum beneath, narrow few-flowered inflorescence, and the white cottony tomentum of the pedicels and involucre bracts.

22. **S. Monroi**, *Hook. f. Fl. Nov. Zel.* ii. 333.—A much-branched woody shrub 2–6 ft. high; branchlets, petioles, and leaves beneath clothed with appressed whitish tomentum. Leaves shortly petioled, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, narrow-oblong or oblong-obovate, obtuse, narrowed into the petiole, coriaceous, glabrous above; margins wrinkled and crenate. Corymbs terminal, lax, leafy, slightly viscid; peduncles clothed with white tomentum; pedicels slender, glandular-pubescent. Heads numerous, broadly turbinate, $\frac{1}{2}$ – $\frac{2}{3}$ in. diam.; involucre bracts 10–15, linear, acute, membranous, glandular-pubescent. Ray-florets 10–15, yellow; ligules $\frac{1}{4}$ in. long, broad, revolute. Disc-florets numerous; limb funnel-shaped, 5-toothed. Achenes linear, grooved, hispid with short white hairs. Pappus-hairs white, slender, minutely scabrid.—*Handb. N.Z. Fl.* 162; *Kirk, Students' Fl.* 348.

SOUTH ISLAND: Nelson—Wangapeka, *Kingsley*! Jollie's Pass, *T. F. C.* Marlborough—Not uncommon from the Awatere to the Conway River. 1000–4500 ft. December–January.

23. **S. revolutus**, *T. Kirk, Students' Fl.* 348.—A small robust shrub 6–20 in. high; branches stout, often decumbent at the base, suberect above. Leaves viscid, on petioles $\frac{1}{3}$ – $\frac{3}{4}$ in. long; blade 1–2½ in., oblong-lanceolate or elliptic-lanceolate to elliptic-oblong, obtuse, narrowed into the petiole, quite entire, coriaceous, glabrous and reticulated above, beneath clothed with pale-buff or white appressed viscid tomentum. Corymb terminal, dense, about 2 in. diam., on a long and stout peduncle clothed with ascending linear-oblong foliaceous bracts; peduncle and pedicels tomentose. Heads 5–15, campanulate, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; involucre bracts linear, acute, tomentose and viscid. Ray-florets 10–15, yellow; ligules broad, revolute. Disc-florets numerous; limb campanulate, 5-toothed. Achenes linear-oblong, grooved, glabrous.—*S. robustus*, *Buch. in Trans. N.Z. Inst.* vi. (1874) 243 (*not of Sch. Bipont.*).

SOUTH ISLAND: Otago—Ben Lomond, Mount Bonland, and other high peaks to the west, *Petrie!* mountains above Lake Harris, *Kirk!* Mount Eglington, *Morton!* 3000–4500 ft. January–March.

24. **S. Adamsii**, *Cheesem. in Trans. N.Z. Inst.* xxviii. (1896) 536.—A small robust much-branched shrub 3–5 ft. high; young branches, leaves, and inflorescence excessively viscid. Leaves shortly petiolate, 1–2 in. long, oblong or oblong-obovate, obtuse, quite entire, extremely thick and coriaceous, glabrous above, beneath covered, except the midrib, with dense white or pale-buff closely appressed tomentum; margins revolute. Corymbs terminal, few-flowered, laxly branched; peduncles and pedicels nearly glabrous but excessively viscid; bracts varying from oblong to linear-spathulate. Heads 5–15, broadly campanulate, $\frac{3}{4}$ in. diam.; involucre bracts linear, obtuse, almost glabrous except a tuft of woolly hairs at the tip. Ray-florets 10–15, yellow; ligules $\frac{1}{4}$ in. long, spreading. Disc-florets numerous; limb 5-toothed. Achenes glabrous or pubescent. Pappus-hairs white, slender, scabrid.—*Kirk, Students' Fl.* 348. *S. pachyphyllus*, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 410 (*not of Remy ex C. Gay*).

NORTH ISLAND: Mount Holdsworth, Tararua Range, *W. Townson!* SOUTH ISLAND: Nelson—Mount Arthur and Mount Peel, *T. F. C.*; Mount Rintoul and Ben Nevis, *Gibbs, Bryant!* Mount Duppa, *J. Macmahon!* 3500–5500 ft. January–February.

Distinguished from *S. revolutus* by the much more coriaceous leaves, with the midrib prominent beneath, narrow laxly branched corymbs, and by the peduncles, pedicels, and involucre bracts being nearly glabrous.

25. **S. bifistulosus**, *Hook. f. Fl. Nov. Zel.* i. 144.—A small much-branched shrub 1–2 ft. high; branches decumbent at the base, erect above; bark pale, closely marked with the scars of the fallen leaves. Leaves crowded at the tips of the branches, spreading, 1 in. long, $\frac{1}{2}$ in. broad, narrow-linear, subacute, coriaceous, grooved above, beneath with the margins revolute to the midrib, a

narrow woolly border showing on each side of the line of junction, the rounded edge of the leaf constricted here and there, and hence appearing crenate. Peduncles terminating the branchlets, 2-4 in. long, clothed with numerous leafy bracts. Heads solitary, $1\frac{1}{2}$ in. diam.; involucral bracts few, broad, herbaceous, woolly on the back. Achenes linear-oblong, glabrous, obscurely ribbed. Pappus white, soft.—*Handb. N.Z. Fl.* 161; *Kirk, Students' Fl.* 344.

SOUTH ISLAND: Dusky Bay, *Lyall, Hector and Buchanan!* 1500-3000 ft.

Two specimens in Mr. Buchanan's herbarium are all I have seen of this curious and most distinct species.

26. *S. cassinioides*, *Hook. f. Handb. N.Z. Fl.* 163.—An erect much-branched shrub 4-10 ft. high; bark deciduous, loose and papery; branches numerous, crowded, spreading, brittle, tomentose above. Leaves loosely imbricating, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, linear or linear-oblong, obtuse or subacute, sessile, coriaceous, entire, glabrous above, beneath clothed with appressed whitish-yellow tomentum. Heads solitary, sessile, terminating the branches, $\frac{1}{3}$ in. diam.; involucral bracts 8-10, linear-oblong, obtuse, coriaceous, tomentose, the inner with broad scarious margins. Florets 12-20; ray-florets 4-6, with a broad and short revolute ligule; disc-florets broadly campanulate, deeply 5-lobed. Achenes linear, grooved, glabrous, expanded into a cup-shaped border at the tip. Pappus-hairs white, rigid, scabrid.—*Kirk, Students' Fl.* 351.

SOUTH ISLAND: Not uncommon in mountain districts from Nelson to north-west Otago. 2000-4000 ft. January-February.

A singular species, quite unlike any other. It has much of the habit of *Cassinia Vauvilliersii*, but is a larger plant, with more numerous crowded branchlets and different tomentum.

27. *S. elæagnifolius*, *Hook. f. Fl. Nov. Zel.* i. 150, t. 41.—A stout or slender spreading shrub 4-10 ft. high; branches grooved, and with the petioles, under-surface of the leaves, and inflorescence densely clothed with pale-buff tomentum. Leaves on grooved petioles $\frac{1}{2}$ - $1\frac{1}{2}$ in. long; blade 2-5 in., obovate or ovate-oblong or elliptic-oblong to oblong-lanceolate, obtuse or subacute, coriaceous, glabrous and shining above, midrib and principal veins usually evident. Panicles terminal, stout, branched; pedicels densely tomentose. Heads $\frac{1}{3}$ in. diam., campanulate or obconic, discoid; involucral bracts 9-12, linear-oblong, obtuse, coriaceous, very densely woolly. Female florets often wanting; when present 1-3, small, tubular with the mouth minutely toothed. Disc-florets numerous, with a narrow-campanulate 5-toothed limb. Achenes linear, grooved, hispid. Pappus-hairs dirty-white, rigid, scabrid.—*Handb. N.Z. Fl.* 162; *Kirk, Students' Fl.* 349.

Var. **Buchanani**, *Kirk, l.c.*—Smaller, densely branched, 3-4 ft. high. Leaves broadly oblong, 1-2 in. long. Panicle reduced to a short raceme.—*S. Buchanani*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 339.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in mountainous localities from the East Cape and Taupo southwards. Ascends to 4500 ft., descends to sea-level in Otago and Stewart Island. December-January.

28. **S. rotundifolius**, *Hook. f. Fl. Nov. Zel.* i. 149.—A stout branching shrub or small tree 6-30 ft. high; bark thin, smooth; branches grooved, and with the petioles, leaves beneath, and inflorescence densely clothed with pale-buff tomentum. Leaves on stout grooved petioles 1-3 in. long; blade 2-5 in. diam., orbicular or broadly oblong, unequal or rounded or slightly cordate at the base, very thick and coriaceous, glabrous and shining above, quite entire. Panicle terminal, corymbosely branched; pedicels stout. Heads numerous, $\frac{1}{3}$ in. diam., campanulate, discoid; involucre bracts 9-12, linear-oblong, very coriaceous, densely woolly. Female florets 1-4, small, narrow-tubular with a minutely toothed mouth. Disc-florets numerous, with a campanulate 5-toothed limb. Achenes grooved, hispid. Pappus-hairs rigid, scabrid.—*Handb. N.Z. Fl.* 162; *Kirk, Forest Fl.* t. 116; *Students' Fl.* 349. *Brachyglottis rotundifolia*, *Forst. Char. Gen.* 92; *A. Cunn. Precur.* n. 464. *Cineraria rotundifolia*, *Forst. Prodr.* n. 294; *A. Rich. Fl. Nouv. Zel.* 254.

SOUTH ISLAND: Nelson—Near Westport, *W. Townson*! Westland and Otago—From Jackson's Bay to Milford Sound and Foveaux Strait, *Lyall, Hector* and *Buchanan*! *Kirk*! STEWART ISLAND: *Petrie*! *Kirk*! Sea-level to 3500 ft. *Puheritaiko*. December-January.

29. **S. Bidwillii**, *Hook. f. Fl. Nov. Zel.* i. 150.—A small stout much or sparingly branched shrub 1-5 ft. high; branches, petioles, leaves beneath, and inflorescence densely clothed with appressed whitish or pale-buff tomentum. Leaves $\frac{1}{2}$ -2 in. long, broadly oblong or obovate-oblong, obtuse, rounded or narrowed at the base, excessively thick and coriaceous, glabrous and shining above, with reticulated venation; margins often tomentose; petioles $\frac{1}{8}$ - $\frac{3}{4}$ in., stout, articulated to the branch. Corymbs terminal, stout, branched, 1-3 in. long. Heads few or many, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam., campanulate, discoid; involucre bracts 8-12, linear, very thick and coriaceous, densely woolly. Female florets 3-5, tubular, mouth minutely toothed. Disc-florets numerous, with a 5-toothed campanulate limb. Achenes linear, grooved, glabrous. Pappus-hairs white, rigid, scabrid.—*Handb. N.Z. Fl.* 162; *Kirk, Students' Fl.* 350. *Olearia rigida*, *Col. in Trans. N.Z. Inst.* xx. (1888) 194.

Var. **viridis**.—Rather taller and not so stout. Leaves $1\frac{1}{2}$ -3 in. long, oblong-obovate, narrowed to the base, not so coriaceous; petioles $\frac{1}{2}$ -1 in. long. Corymbs larger, 3-6 in. long. Heads much as in the type.—*S. viridis*, *Kirk, Students' Fl.* 350.

NORTH ISLAND: Not uncommon on the mountains from the East Cape and Taupo southwards. SOUTH ISLAND: Var. *viridis*: Mountains of Nelson, Marlborough and Canterbury, from Mount Arthur to the Rakaia Valley. 2500–5000 ft. December–January.

Mr. Kirk has described the South Island plant as a distinct species under the name of *S. viridis*. It is somewhat larger in all its parts, but differs in no essential character, and is far better regarded as a variety only. Specimens of *S. Bidwillii* collected at the foot of Ruapehu by the Rev. F. H. Spencer almost match others gathered in the South Island by myself.

30. ***S. geminatus***, *T. Kirk, Students' Fl.* 350.—A small spreading shrub 1–4 ft. high; perfectly glabrous in all its parts, but the young branchlets, leaves, and involucre glutinous; branches slender, angled, grooved. Leaves $1\frac{1}{2}$ –3 in. long, $\frac{1}{2}$ –1 in. broad, obovate-lanceolate or obovate-spathulate, acute or subacute, gradually narrowed to a sessile and decurrent base, serrate, subcoriaceous; veins thin, subflabellate. Corymbs terminal, lax, leafy at the base; peduncles slender, usually forked, with sparse linear bracts above. Heads few, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., discoid and homogamous; involucre bracts about 8, in 1 series, shorter than the florets, linear-oblong, obtuse, coriaceous, with broad membranous ciliolate margins. Receptacle flat, alveolate. Florets 12–15, all tubular and hermaphrodite; limb campanulate, deeply 5-lobed. Stamens exserted; anthers not tailed. Achenes linear-oblong or linear-obovoid, narrowed at both ends, grooved, glabrous. Pappus-hairs in 1 series, rigid, scabrid.—*Traversia baccharoides*, *Hook. f. Handb. N.Z. Fl.* 164; *l.c. Plant.* t. 1002.

SOUTH ISLAND: Mountains of Nelson, Marlborough, and Canterbury; not uncommon from Mount Arthur to the Upper Waimakariri. 1500–4500 ft. January–February.

A very remarkable species, with a more rigid pappus than is usual in *Senecio*, and in other respects resembling the Juan Fernandez genera *Balbisia* and *Robinsonia*. Sir J. D. Hooker created the genus *Traversia* for its reception, but in the “Genera Plantarum” it was reduced to *Senecio*.

22. **MICROSERIS**, Don.

Annual or perennial glabrous herbs. Leaves chiefly radical, entire or toothed or pinnatifid. Scapes long, leafless, single-headed. Heads homogamous. Involucre oblong or cylindric; bracts in about 2 series, with a few short imbricate ones below. Receptacle flat, without scales. Florets all ligulate, yellow. Achenes narrow, attenuate at the base, cylindrical, ribbed. Pappus of few or several linear flat scales tapering into simple or plumose bristles.

A genus of 16 or 18 species, all western North American except one from Chili and another from Australia and New Zealand.

1. ***M. Forsteri***, *Hook. f. Fl. Nov. Zel.* i. 151.—A perfectly glabrous perennial herb; roots thick and fleshy, almost tuberous,

juice milky. Leaves all radical, very variable in size, 2–10 in. long, narrow-linear to lanceolate, flaccid, entire or irregularly toothed or pinnatifid; the lobes narrow, distant, spreading. Scapes usually exceeding the leaves, rarely shorter, sometimes puberulous above. Heads solitary, $\frac{1}{2}$ – $\frac{2}{3}$ in. long; involucre bracts linear, acute, rather fleshy, with membranous borders. Florets longer than the involucre. Achenes linear, deeply grooved. Pappus-bristles slightly dilated below, serrulate or shortly plumose.—*Fl. Tasm.* i. 226, t. 66; *Handb. N.Z. Fl.* 164; *Benth. Fl. Austral.* iii. 676; *Kirk, Students' Fl.* 356. *M. pygmæa*, *Raoul, Choix*, 45 (not of *Hook. and Arn.*). *Scorzonera scapigera*, *Forst. Protr.* 534; *A. Cunn. Precur.* n. 430.

NORTH AND SOUTH ISLANDS: From the Middle Waikato and Rotorua southwards; plentiful. Sea-level to 4000 ft. December–February.

23. PICRIS, Linn.

Erect branched hispid herbs with milky juice. Leaves alternate or radical, entire or toothed or pinnatifid. Heads corymbose, yellow, homogamous. Involucre urceolate or campanulate, inner bracts in 1 series, subequal; outer in several series, narrow, herbaceous; or the outermost broad and foliaceous. Receptacle flat, naked. Florets all ligulate. Anthers sagittate at the base, acute or setaceous. Achenes linear or oblong, more or less incurved, subterete or angled, 5–10-ribbed with the ribs transversely rugose, narrowed above or distinctly beaked. Pappus copious, of 2 series of soft hairs; inner broad at the base, plumose; outer fewer slender.

Species about 24, mainly natives of Europe and temperate Asia, the New Zealand species widely spread in most temperate and subtropical countries.

1. *P. hieracioides*, *Linn. Sp. Plant.* 792.—A biennial herb 1–3 ft. high, more or less hispid with simple or barbed hairs; stem corymbosely branched above. Leaves 3–6 in. long, linear-oblong, lanceolate or linear, sinuate-toothed, the lower ones tapering into a petiole, the upper smaller and narrower, sessile, stem-clasping. Peduncles long, slender. Heads $\frac{3}{4}$ –1 in. diam.; involucre bracts hispid and pubescent. Achenes red-brown, narrow-ellipsoid, tapering into a short beak, very strongly transversely ribbed. Pappus-hairs deciduous, soft, white, plumose.—*A. Cunn. Precur.* n. 432; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 151; *Handb. N.Z. Fl.* 165; *Benth. Fl. Austral.* iii. 678; *Kirk, Students' Fl.* 357. *P. attenuata*, *A. Cunn. Precur.* n. 433.

NORTH ISLAND: Not uncommon from the North Cape to the Upper Thames and Waikato. SOUTH ISLAND: Nelson—Foxhill, *T. F. C.* Canterbury—Broken River basin, *T. F. C.* Sea-level to 2500 ft. August–December.

24. **CREPIS**, Linn.

Annual or perennial branched or rarely scapigerous herbs, juice milky. Leaves radical or alternate, entire or toothed or pinnatifid. Heads peduncled, solitary or panicled or corymbose, yellow or red, homogamous. Involucre campanulate or cylindric; bracts many, linear, equal, with a few smaller ones at their base. Receptacle flat or slightly concave, naked or fimbriate. Florets all ligulate. Achenes linear-oblong, 10–20-ribbed, narrowed or beaked at the tip. Pappus short or long, usually copious; hairs soft, white, simple.

A large genus, containing about 130 species, most abundant in the temperate regions of the Northern Hemisphere, but extending also into subtropical districts. The single New Zealand species is a somewhat anomalous member of the genus; it was referred to *Hieracium* by Banks and Solander, to *Crepis* by Hooker, and to *Sonchus* in the "Genera Plantarum."

1. **C. novæ-zealandiæ**, Hook. f. *Handb. N.Z. Fl.* 164. — A small scapigerous herb 2–8 in. high, either glabrous or the involucre and scapes, rarely the leaves, white and tomentose; root stout, fleshy. Leaves all radical, spreading, crowded, glaucous, 2–6 in. long, narrow linear-oblong or linear-obovate, deeply and unequally lobed or pinnatifid, the terminal segment large, rounded, lateral much smaller, entire or toothed. Scape slender, longer than the leaves, glabrous or tomentose, often studded with black glandular hairs. Head solitary, $\frac{1}{2}$ –1 in. diam.; involucre bracts broadest at the base, gradually narrowed into obtuse black tips, glabrous or cottony and sparsely covered with black glandular hairs. Achene linear-oblong, glabrous, compressed, ribbed. Pappus-hairs copious, very soft, white.—*Lindsay, Contr. N.Z. Bot.* 54, t. 3; *Kirk, Students' Fl.* 359.

SOUTH ISLAND: Not uncommon in mountain districts on the east side of the island. Sea-level to 3000 ft. January–February.

25. **TARAXACUM**, Linn.

Scapigerous perennial herbs with milky juice. Leaves all radical, entire or sinuate- or runcinate-pinnatifid. Heads solitary on leafless scapes, yellow, homogamous. Involucre campanulate or oblong; bracts herbaceous; inner in 1 series, equal, erect; outer in several series, smaller, often recurved. Receptacle flat, naked. Florets all ligulate. Anthers sagittate at the base, not tailed. Achenes oblong or fusiform, terete or angled or compressed, ribbed, muricate, attenuate at the base, above narrowed into a long and slender beak. Pappus-hairs copious, in many series, simple, white.

A small genus, widely spread in the temperate regions of both hemispheres. The New Zealand species has the range of the genus.

1. **T. officinale**, Wigg. *Prim. Fl. Holsat.* 56.—Root long, stout, black. Leaves very variable, 2–6 in. long, oblanceolate or linear-obovate or spatulate, sinuate-toothed or runcinate-pinnatifid, with broad triangular lobes pointing downwards, terminal lobe larger, usually rounded. Scapes 2–8 in. high. Head $\frac{1}{3}$ – $1\frac{1}{2}$ in. diam. Involucre campanulate; inner bracts linear, often thickened towards the tip; outer shorter and broader, erect or reflexed. Achenes narrow-obovoid, ribbed, the ribs muricate above the middle, beak long, equalling or exceeding the achene itself.—*Hook. f. Fl. Nov. Zel.* i. 152; *Kirk, Students' Fl.* 361. *T. dens leonis*, *Desf. Fl. Atlant.* ii. 228; *Hook. f. Handb. N.Z. Fl.* 165.

NORTH AND SOUTH ISLANDS: Not uncommon throughout, ascending to 4000 ft. *Dandelion.* November–February.

A very variable plant. The large lowland forms, common in pastures or in rich cultivated soils, are probably introduced; but the small mountain state, with small leaves, slender scapes sometimes barely 2 in. high, and heads $\frac{1}{3}$ – $\frac{2}{3}$ in. diam., is certainly indigenous, as it was collected by Banks and Solander.

26. SONCHUS, Tourn.

Erect leafy annual or perennial succulent herbs, juice milky. Leaves alternate or radical, entire or toothed or pinnatifid; cauline often amplexicaul. Heads peduncled, in terminal irregularly branched corymbs or panicles, homogamous. Involucre ovoid, usually becoming conical after flowering; bracts imbricated in several series, the outer smaller. Receptacle flat, naked. Florets all ligulate. Anthers shortly tailed at the base. Achenes ovoid or ellipsoid, more or less compressed, ribbed and often transversely rugose, not beaked. Pappus-hairs copious, in many series, soft, white, simple.

Species from 24 to 28, mostly natives of the temperate regions of the Northern Hemisphere; a few spread over the whole world, but probably naturalised in many districts. One of the New Zealand species is endemic, the two others are cosmopolitan.

* Annual.

Upper leaves amplexicaul, with rounded auricles.	
Achenes longitudinally ribbed, not transversely wrinkled	1. <i>S. asper</i> .
Upper leaves amplexicaul, with acute auricles. Achenes longitudinally ribbed and transversely wrinkled ..	2. <i>S. oleraceus</i> .

** Perennial.

Leaves large, 1–2½ ft. long. Heads 1–1½ in. diam., purplish; pedicels cottony	3. <i>S. grandifolius</i> .
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1. **S. asper**, *Hill, Herb. Brit.* i. 47.—A tall succulent annual herb 2–3 ft. high, with a hollow grooved stem, glabrous or sparsely glandular above. Leaves lanceolate, entire or toothed or pinnatifid;

margins waved or crisped, spinous-toothed; lower ones petiolate, upper semi-amplexicaul with rounded auricles. Heads $\frac{3}{4}$ –1 in. diam., crowded in a short corymbose panicle, sometimes almost umbellate. Involucre glabrous, bracts acute. Achenes oblong, compressed, longitudinally ribbed but not marked with transverse wrinkles or asperities.—*Kirk, Students' Fl.* 362. *S. oleraceus* var. β , *Hook. f. Fl. Nov. Zel.* i. 153; *Handb. N.Z. Fl.* 166.

Var. *littoralis*, *Kirk in Trans. N.Z. Inst.* xxvi. (1894) 265.—Often biennial or perennial. Stems rather stout, 1–2 ft. high, sparingly branched; root thick and fleshy. Leaves mostly radical, spreading, 3–7 in. long, linear-oblong or linear-obovate, obtuse or acute, finely or coarsely toothed, rather thick, almost fleshy; cauline leaves few, acute, amplexicaul. Outer involucre bracts obtuse, inner acute. Achenes longitudinally ribbed, glabrous.—*Students' Fl.* 362.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, from the North Cape southwards; the variety *littoralis* confined to maritime cliffs. *Sow-thistle*; *Rauroroa*; *Tawheke*; *Puwaha*. Flowers from spring to autumn.

As this was collected by Banks and Solander it must be regarded as indigenous. The variety *littoralis* is a very curious form, and may be entitled to rank as a species.

2. *S. oleraceus*, *Linn. Sp. Plant.* 794.—A tall erect annual herb 2–3 ft. high, glabrous or sparsely glandular above. Leaves lanceolate, entire or toothed or pinnatifid; margins flat or nearly so, not crisped; lower ones petiolate, upper semi-amplexicaul with sagittate acute auricles. Heads $\frac{3}{4}$ –1 in. diam., crowded in a short corymbose panicle, often subumbellate. Involucres glabrous or slightly cottony at the base, sometimes with a few glandular hairs. Achenes linear-oblong, compressed, longitudinally grooved and conspicuously transversely wrinkled.—*S. oleraceus* var. *a*, *Hook. f. Fl. Nov. Zel.* i. 153; *Handb. N.Z. Fl.* 166; *Kirk, Students' Fl.* 362.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. *Sow-thistle*; *Pororoa*; *Rauriki*. Flowers from spring to autumn. Perhaps not truly native.

3. *S. grandifolius*, *T. Kirk in Trans. N.Z. Inst.* xxvi. (1894) 266.—Rootstock stout, fleshy, creeping, sometimes $2\frac{1}{2}$ in. diam. Stem tall, robust, succulent, corymbosely branched above, 2–5 ft. high. Radical leaves 1– $2\frac{1}{2}$ ft. long, 4–8 in. broad; petioles 6–9 in., stout, dilated at the base but not amplexicaul; blade oblong or ovate-oblong, irregularly pinnatifid or pinnate; segments 4–6 pairs, broad, overlapping, coarsely doubly serrate or dentate, almost spinous-toothed, subcoriaceous, scabrid above, veins finely reticulate. Upper cauline leaves sessile by a broad base. Heads large, 1– $1\frac{1}{2}$ in. diam.; pedicels clothed with white cottony wool. Involucral bracts in 3–4 series, broadest at the base, gradually tapering into

blunt points, the outer with a row of short spines down the median line. Florets numerous, purplish. Achenes large, broad, spongy, with 3-6 longitudinal ribs; margins broad.—*Students' Fl.* 362.

CHATHAM ISLANDS: *Enys! Cox!* January–February.

A very handsome and distinct species, endemic in the Chatham Islands.

ORDER XXXIX. STYLIDIEÆ.

Herbs, rarely undershrubs. Leaves alternate, scattered or densely imbricate, entire; stipules wanting. Flowers hermaphrodite or unisexual, irregular or almost regular. Calyx adnate to the ovary; lobes usually 5, free or connate into two lips. Corolla gamopetalous, 5-lobed; the lobes subregular and equal in the New Zealand genera, but in the bulk of the order the lowest lobe is smaller and narrower and recurved, and is known as the labellum. Stamens 2; filaments united with the style into a column; anthers sessile at the top of the column. Ovary inferior, more or less completely 2-celled, usually crowned with 1 or 2 fleshy glands. Stigma at the apex of the column, entire or 2-lobed, hidden between the anthers or protruding from between them. Ovules numerous in each cell, attached to the dissepiment or to a central axis, anatropous. Fruit a 1-2-celled capsule, dehiscent or indehiscent. Seeds numerous or few by abortion, minute; albumen fleshy; embryo very minute, next the hilum.

A small order, comprising 5 genera and about 110 species, mainly confined to Australia, 97 species being endemic therein. Of the 3 New Zealand genera, *Oreostylidium* is endemic; *Phyllachne* extends to antarctic South America; while *Forstera* has a single species in Tasmania in addition to the 3 New Zealand ones.

A. Stems densely matted, forming hard bright-green convex patches. Capsule turbinate.

Leaves densely imbricated. Flowers sessile among the leaves at the tips of the branches 1. PHYLLACHNE.

B. Stems not forming compact patches. Capsule ovoid or oblong.

Stems short. Leaves tufted, squarrose, subulate. Scapes shorter than the leaves. Calyx 2-lipped 2. OREOSTYLIDIUM.
Stems slender, branched. Scapes long. Calyx 5-6-lobed, not bilabiate 3. FORSTERA.

1. PHYLLACHNE, Forst.

Densely tufted perfectly glabrous moss-like plants, forming hard and compact flat or convex masses in alpine localities. Leaves small, closely imbricating. Flowers sessile among the leaves at the tips of the branches, monœcious or polygamo-diœcious. Calyx-tube obconic; lobes 5-9, equal or slightly unequal. Corolla almost regular; tube short; limb spreading, with 4-9 subequal

lobes, often glandular at the base. Column short, straight, erect. Epigynous glands 2, semi-lunar. Ovary obovoid-turbinate, broad at the top, imperfectly 2-celled at the base. Capsule small, turbinate, flattened at the summit, coriaceous, indehiscent. Seeds numerous, obovoid.

The genus differs from *Forstera* mainly in habit and in the turbinate capsule. In addition to the three species found in New Zealand there is another in Fuegia. The New Zealand forms are much too closely allied, and should probably be treated as varieties of *P. clavigera*. They were separated mainly on account of differences in the width of the leaves and length of the column, but these characters break down when a large series of specimens is under examination.

Leaves linear, broad at the base. Column scarcely exerted	1. <i>P. clavigera</i> .
Leaves shorter, broadly ovate at the base. Column much exerted	2. <i>P. Colensoi</i> .
Leaves linear, not broad at the base. Column included or scarcely exerted	3. <i>P. rubra</i> .

1. ***P. clavigera***, *F. Muell. Fragm.* viii. 40.—Stems short, 1–2½ in. long, most densely compacted, leafy throughout. Leaves erect, imbricated in very many series, ½ in. long, linear-oblong with a dilated base, concave in front, convex at the back, very thick and coriaceous, quite entire; tips obtuse, thickened and knobbed, a glandular pore on the back just below the apex. Flowers white, ⅛–⅙ in. diam. Calyx-lobes 5–6, linear-oblong, obtuse. Corolla-lobes 5–7, obovate, those of the male flowers without glands at the base or with very indistinct ones, the females or hermaphrodites with conspicuous linear glands. Column stout, erect, slightly exerted. Anthers narrow-reniform. Stigmas of the female flowers large, plumose-papillose; of the males or hermaphrodites smaller, smooth, almost hidden between the anthers. Capsule turbinate, ultimately opening by the falling-away of the top. Seeds 6–8.—*Helophyllum clavigerum*, *Hook. f. Handb. N.Z. Fl.* 167. *Forstera clavigera*, *Hook. f. Fl. Antarct.* i. 38, t. 28. *F. aretriastriifolia*, *Homb. & Jacq. Bot. Voy. Astrol. et. Zél.* t. 16c.

SOUTH ISLAND: Various localities in the Alps of Canterbury and Otago, apparently not common; altitude 4000–6000 ft. AUCKLAND AND CAMPBELL ISLANDS: Abundant on the hills; 500–1250 ft. December–March.

For a full account of this singular plant reference should be made to the detailed description and excellent plate given in the “*Flora Antarctica*.”

2. ***P. Colensoi***, *Berggren in Minnesk. Fisiog. Sällsk. Lund.* (1877) 11.—Habit and appearance of *P. clavigera*, but leaves shorter and broader, often broadly ovate at the base. Flowers rather smaller; column much longer and more slender, far exerted beyond the corolla in the usual state.—*Helophyllum Colensoi*, *Hook. f. Handb. N.Z. Fl.* 168. *H. muscoides*, *Col. in Trans. N.Z. Inst.* xxvi. (1894) 318. *Forstera clavigera*, *Hook. f. Fl. Nov. Zél.* i. 155 (not of *Fl. Antarct.*).

Var. **Haastii**.—Upper half of leaf narrower, semiterete, not thickened at the tip.—*P. Haastii*, *Berggr. in Journ. Bot.* ix. n.s. (1880) 104. *P. Colensoi*, *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) t. 3, f. 1 to 27.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Hikurangi, Tongariro, and Mount Egmont southwards, an abundant alpine plant. 3000–6000 ft. December–February.

This appears to pass imperceptibly into *P. clavigera*, and should be regarded as a variety of that species.

3. **P. rubra**, *Cheesem.*—Stems shorter than in *P. clavigera*, $\frac{1}{2}$ –1 in. high, densely tufted, frequently bare of leaves below. Leaves erect, very densely imbricated, linear, not dilated at the base or very obscurely so, very thick and coriaceous; tips much thickened, forming a large globose knob. Flowers $\frac{1}{6}$ – $\frac{1}{5}$ in. diam., white, but becoming dark-red when dry. Corolla-lobes 5–7, unequal. Column stout, included or slightly exserted.—*Helophyllum rubrum*, *Hook. f. Handb. N.Z. Fl.* 168; *Buch. in Trans. N.Z. Inst.* xiv. (1882) 351, t. 31, f. 2.

SOUTH ISLAND: Otago—Mount Aspiring Range, *Buchanan* and *McKay*! Mount Arnould and the Hector Mountains, *Petrie*! 4500–6000 ft. January–March.

This is evidently close to *P. clavigera*, but the large globose knobs at the tips of the leaves give it a distinct appearance.

2. OREOSTYLIDIUM, Berggr.

A small stemless perennial herb. Leaves numerous, all radical. Scape short, 1-flowered. Calyx more or less evidently 2-lipped; lower lip 2-fid, upper lip 3-fid. Corolla almost regular, campanulate, deeply 5-lobed; the lobes equal in size, irregularly spreading. Column short, straight, erect, much shorter than the corolla-lobes; anthers didymous, 4-celled and 4-lobed; lobes ultimately spreading; stigma placed between the anthers, 2-lobed, lobes spreading and deflexed. Ovary 2-celled or 1-celled by imperfection of the dissepiment; ovules numerous, attached to the centre of the dissepiment. Capsule coriaceous, indehiscent or tardily rupturing, more or less completely 2-celled. Seeds numerous, obovoid; testa lax, cellular.

A monotypic genus confined to New Zealand. It differs from *Stylidium* in the corolla-lobes being equal in size, in the short erect column, and in the indehiscent fruit.

1. **O. subulatum**, *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) n. viii. 1, t. 1.—Small, densely tufted. Rootstock short, often emitting stolons; roots long, fibrous. Leaves spreading and recurved, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, linear-subulate, mucronate or almost pungent, rigid when dry, concave above, slightly convex beneath, quite glabrous; margins entire. Scape much shorter than the

leaves, stout, and with the calyx glandular-pubescent. Flower small, $\frac{1}{6}$ in. diam. Calyx-lobes variable in depth. Corolla-lobes oblong, obtuse. Capsule $\frac{1}{4}$ in. long, ovoid-oblong, almost woody. —*O. affine*, *Col. in Trans. N.Z. Inst.* xx. (1888) 197. *Stylidium*(?) *subulatum*, *Hook. f. Handb. N.Z. Fl.* 168. *Phyllachne* (*Forstera*) *subulata*, *F. Muell. in Journ. Bot.* 1878, 174.

NORTH ISLAND: Base of Tongariro, *Berggren, Kirk!* Ruahine Mountains, *H. Tryon!* SOUTH ISLAND: Nelson—Not uncommon in mountain districts, *Travers, Haast, Buchanan!* *T. F. C.*; Mount Rochfort, *Townson!* Otago—Wet peaty localities in the east and south, *Berggren, Kirk!* *Petrie!* *Buchanan.* STEWART ISLAND: *Petrie!* *Kirk!* Sea-level to 4000 ft. December–March.

3. *FORSTERA*, Linn. f.

Glabrous perennial herbs. Stems simple or branched, erect or decumbent. Leaves small, entire, densely or laxly imbricating, spreading or recurved. Peduncles terminal, slender, 1-flowered or more rarely 2–5-flowered. Flowers white, erect or nodding, sometimes unisexual. Calyx-tube ovoid; lobes 5 or 6, equal or nearly so. Corolla almost regular; tube short; limb campanulate, with 5–9 nearly equal lobes; throat naked or glandular. Column short, erect. Ovary oblong or ovoid, imperfectly 2-celled at the base. Capsule 1-celled, somewhat membranous, opening at the apex. Seeds numerous, elliptical or fusiform; testa lax, produced at each end.

In addition to the three species described below, which are confined to New Zealand, there is another from the mountains of Tasmania.

- | | |
|--|--------------------------|
| Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in., imbricate, recurved, sessile, obovate-spathulate; midrib broad and thick, cuneate | 1. <i>F. sedifolia</i> . |
| Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., close-set, spreading and recurved, sessile, obovate or linear-obovate; midrib indistinct | 2. <i>F. Bidwillii</i> . |
| Leaves $\frac{1}{4}$ – $\frac{3}{8}$ in., lax, erect or spreading, shortly petioled, oblong-obovate; midrib obsolete | 3. <i>F. tenella</i> . |

1. *F. sedifolia*, *Linn. f. Suppl.* 407.—Stems 2–12 in. long, stout or slender, simple or sparingly divided, rarely much branched, erect or decumbent at the base, densely leafy throughout. Leaves closely imbricating, spreading and recurved, sessile by a broad base, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, obovate-spathulate or oblong-spathulate, obtuse, very thick and coriaceous, shining, often reddish-brown, nerveless above, midrib thickened and almost cuneate beneath; margins broad, cartilaginous. Peduncle slender, strict, 2–4 in. long, 1–2-flowered. Flowers very variable in size, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. or more. Bracts 2–3, oblong, obtuse. Calyx-lobes 6, linear-oblong, obtuse. Corolla-tube very short; lobes 6, linear-oblong, obtuse, each with 2 linear glands at the base. Column short; anthers 2, sessile at the top of the column, transverse, reniform; stigma 2-lobed, the lobes spreading between the anthers, papillose. Epigynous glands 2, narrow-clavate. Capsule oblong-clavate.—*A. Rich. Fl. Nouv. Zel.* 229; *A.*

Cunn. Precur. n. 427; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 154; *Handb. N.Z. Fl.* 166; *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) n. viii. 9, t. 2, f. 20. *Phyllachne sedifolia*, *F. Muell. Fragm.* viii. 40.

Var. **oculata**.—Flowers much larger, $\frac{1}{2}$ – $\frac{3}{4}$ in., usually with a dark eye.

SOUTH ISLAND, STEWART ISLAND: Not uncommon on the higher mountains, chiefly in the central and western districts. Var. *oculata*: Mount Rochfort, near Westport, *W. Townson*! Humboldt Mountains, *Cockayne*! Clinton Saddle, *Petrie*! Frazer Peaks (Stewart Island), *Thomson* and *Petrie*! Altitudinal range, 2000–5000 ft. December–March.

Best distinguished by the short and broad very coriaceous recurved leaves, with a broad and thick cuneate midrib beneath.

2. **F. Bidwillii**, *Hook. f. Fl. Nov. Zel.* i. 155.—Stems 2–8 in. long, rather stout, usually branched above, decumbent or rooting below, lower part naked and scarred, often reddish, upper portion leafy. Leaves numerous, close-set, spreading and often recurved, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, obovate or linear-obovate to linear-oblong, obtuse or subacute, coriaceous, not shining, green, nerveless above, midrib very indistinct beneath; margins cartilaginous, flat or recurved. Peduncle 2–4 in. long, 1–3-flowered. Flowers much as in *F. sedifolia*, but smaller, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., rarely more. Corolla-lobes shorter and broader, linear glands at the base of the lobes more conspicuous. Epigynous glands subulate. Capsule oblong-clavate.—*Handb. N.Z. Fl.* 167; *Berggr. l.c.* t. 2, f. 1 to 19. *F. truncatella*, *Col. in Trans. N.Z. Inst.* xx. (1888) 196. *F. major*, *Col. l.c.* xxxi. (1899) 272.

NORTH AND SOUTH ISLANDS: Not uncommon in mountain districts from Hikurangi, Tongariro, and Mount Egmont to the south of Otago. 2500–6000 ft. December–March.

Closely allied to the preceding, but perhaps sufficiently distinct in the longer and more laxly placed less coriaceous leaves, which have a very indistinct midrib beneath. Berggren's figure is by no means characteristic of the usual state of the species.

3. **F. tenella**, *Hook. f. Fl. Nov. Zel.* i. 155.—Very closely allied to *F. Bidwillii*, and probably a mere variety of that plant, but more slender and less branched, with much fewer laxly placed leaves. Leaves erect or spreading, seldom recurved, $\frac{1}{4}$ – $\frac{1}{2}$ in. long or more, narrow oblong-obovate, obtuse or subacute, narrowed into a short petiole, dark-green and veinless above, midrib obsolete beneath, hardly coriaceous; margins flat or recurved. Flowers similar to those of *F. Bidwillii*, but rather narrower. Capsule narrow-clavate.—*Handb. N.Z. Fl.* 167; *Berggr. l.c.* t. 2, f. 21 to 39.

NORTH AND SOUTH ISLANDS: Mountain districts from the Ruahine Range southwards; not uncommon. 1500–4500 ft. December–March.

ORDER XL. GOODENOVIEÆ.

Herbs or shrubs. Leaves alternate or radical, rarely opposite; stipules wanting. Flowers hermaphrodite, irregular or rarely regular, axillary or terminal, solitary or in spikes or racemes or panicles. Calyx-tube adnate to the ovary, limb of 5 persistent lobes or obsolete. Corolla gamopetalous, usually irregular, 5-lobed, often split to the base at the back. Stamens 5, alternate with the lobes of the corolla and inserted at its base; anthers free or rarely connate into a ring surrounding the style. Ovary inferior or nearly so, 1-2-celled; style simple, with a cup-shaped or 2-lipped expansion which encloses the stigma, and is called the indusium; ovules 1 or 2 or more in each cell, erect or ascending. Fruit an indehiscent drupe or nut or a 2-4-valved capsule. Seeds albuminous; embryo axile, radicle next the hilum.

An order containing 12 genera and about 200 species, nearly the whole of which are confined to Australia, a few species of *Scaevola* extending to the Pacific islands and the coasts of tropical Asia and Africa, and one species of *Selliera* to South America. The order has no important properties.

Creeping fleshy herb. Leaves linear - spatulate, entire.

Berry many-seeded. 1. SELLIERA.

The New Zealand species a diffuse or procumbent under-

shrub. Drupe 2-celled, with one seed in each cell . . 2. SCAEVOLA.

1. SELLIERA, Cav.

Small glabrous creeping and rooting perennial herbs. Leaves alternate or fascicled at the nodes, entire. Flowers axillary, sessile or pedunculate. Calyx-tube adnate to the ovary; limb 5-lobed or -partite. Corolla oblique, split to the base at the back; limb of 5 nearly equal lobes, at length digitately spreading; the margins inflexed or winged. Stamens 5, epigynous; anthers free. Ovary inferior, more or less completely 2-celled; ovules numerous in each cell. Style undivided; stigma short, truncate, enclosed within the cup-shaped indusium. Fruit fleshy, indehiscent. Seeds usually numerous, compressed or irregularly shaped.

A small genus of two species, one of which is confined to Western Australia; the other occurs in Australia, Tasmania, and Chili, as well as in New Zealand.

1. *S. radicans*, Cav. *Ic. v. 49, t. 474*.—A glabrous creeping and rooting perennial; stems 1-10 in. long, usually matted and interlaced, forming broad flat patches. Leaves variable in size, $\frac{1}{2}$ -4 in. long, linear-spathulate to oblong-spathulate or obovate-spathulate, obtuse, narrowed into a long petiole, quite entire, nerveless, very thick and fleshy. Peduncles axillary, 1- or rarely 2-flowered, shorter than the leaves, with 2 subulate bracts above the middle. Flowers white, $\frac{1}{3}$ in. long. Calyx-lobes lanceolate or linear. Corolla-lobes ovate, acute, not winged. Fruit fleshy, ovoid or obovoid, about $\frac{1}{4}$ in. long. Seeds compressed, orbicular, narrowly

winged.—*Handb. N.Z. Fl.* 173; *Fl. Tasm.* i. 231; *Benth. Fl. Austral.* iv. 82. *S. fasciculata*, *Buch. in Trans. N.Z. Inst.* iii. (1871) 211. *S. microphylla*, *Col. l.c.* xxii. (1890) 473. *Goodenia repens*, *Labill. Pl. Nov. Holl.* i. 53, t. 76; *A. Rich. Fl. Nouv. Zel.* 228; *A. Cunn. Precur.* n. 428; *Raoul, Choix*, 45; *Hook. f. Fl. Nov. Zel.* i. 156.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common in muddy or sandy or rocky places near the sea. Inland by the margins of the larger lakes, &c., ascending to over 2500 ft. at the base of Ruapehu. November–February.

For notes on the fertilisation, see a paper by myself in the *Trans. N.Z. Inst.* ix. p. 542.

2. SCÆVOLA, Linn.

Herbs, undershrubs, or shrubs. Leaves alternate, rarely opposite, entire or toothed. Flowers axillary, solitary or in small cymes. Calyx-tube adnate to the ovary; limb short, 5-partite or cupular, sometimes obsolete. Corolla oblique, split to the base at the back; lobes 5, nearly equal, at length digitately spreading. Stamens 5; anthers free. Ovary inferior or the summit free, 2-celled; ovules solitary in each cell, erect. Style undivided; stigma truncate or 2-lobed, enclosed in the cup-shaped indusium. Fruit indehiscent, exocarp succulent or thin and membranous, endocarp woody or bony or rarely crustaceous. Seeds solitary in each cell.

A large genus of 60 or 70 species, over 50 of which are confined to Australia. The remainder are scattered through the Pacific islands and along the coasts of tropical Asia, one extending to tropical Africa and the West Indies. The single species found in New Zealand is endemic.

1. *S. gracilis*, *Hook. f. in Journ. Linn. Soc.* i. (1857) 129.—A procumbent undershrub 2–4 ft. high; branches long, spreading, and with the leaves clothed with silky hairs; axils of the leaves densely villous. Leaves alternate, 1–3 in. long, obovate-lanceolate or oblong-lanceolate, acute, serrate-dentate, narrowed into a rather long petiole. Flowers $\frac{3}{4}$ in. long, axillary, solitary, sessile or shortly peduncled, white with a yellow eye, sweet-scented; bracts 2, rarely 4, linear-lanceolate. Calyx cupular, indistinctly lobed. Corolla with a short villous tube and 5 narrow segments, mucronate at the tips. Stamens equal, shorter than the corolla-tube. Style pilose; indusium deeply cup-shaped, margins fringed. Fruit not seen.—*Handb. N.Z. Fl.* 173.

KERMADEC ISLANDS: Abundant on cliffs near the sea, *McGillivray, Shakespear!* *T. F. C.* July–December.

Hooker describes the calyx as having 3 subulate lobes and 2 shorter intermediate ones, but in my own specimens and Mr. Shakespear's it is invariably cupular and very indistinctly lobed.

ORDER XLI. CAMPANULACEÆ.

Herbs or shrubs, usually with milky juice. Leaves alternate, seldom opposite, entire or toothed, rarely lobed or dissected; stipules wanting. Flowers hermaphrodite, rarely unisexual, regular or irregular. Calyx-tube adnate to the ovary; limb 4-6- usually 5-lobed. Corolla gamopetalous, epigynous, regular or irregular and split to the base at the back, 4-6-lobed; lobes valvate, often induplicate. Stamens as many as the corolla-lobes and alternate with them, epigynous or more rarely inserted on the tube of the corolla; anthers free or united into a tube. Ovary inferior, rarely semi-superior, 2-5-celled; style single; stigmatic lobes as many as cells to the ovary; ovules numerous, anatropous, placentas in the inner angles of the cells. Fruit a capsule or berry. Seeds numerous, small; albumen fleshy; embryo straight, axile; radicle next the hilum.

A large order, perhaps most abundant in the temperate regions of the Northern Hemisphere, but extending through the tropics, plentiful in South Africa, and present in fair numbers in other portions of the south temperate zone. Genera 55; species about 1000. As a whole, the order is characterized by the presence of acrid and poisonous qualities, and many of the species are highly dangerous. Few possess any economic importance, but many kinds of *Campanula* and *Lobelia* are cultivated in gardens for the beauty of their flowers. Of the New Zealand genera, *Lobelia* and *Wahlenbergia* are widely distributed; *Pratia* is confined to the south temperate zone; *Isotoma* is chiefly Australian; while *Colensoa* is endemic.

TRIBE 1. LOBELIÆ.

Corolla irregular, 2-lipped. Anthers cohering.

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| Tall herb. Flowers in racemes. Fruit an indehiscent berry | 1. COLENOSA. |
| Creeping herbs. Flowers solitary, axillary. Fruit an indehiscent berry | 2. PRATIA. |
| Herbs. Corolla split to the base at the back. Stamens free from the corolla-tube. Fruit a capsule, 2-valved at the tip | 3. LOBELIA. |
| Herbs. Corolla not split to the base; stamens affixed to the tube. Fruit a capsule, 2-valved at the tip | 4. ISOTOMA. |

TRIBE 2. CAMPANULÆ.

Corolla regular. Anthers free.

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|---|------------------|
| Herbs. Corolla campanulate. Capsule 2-3-valved at the tip | 5. WAHLENBERGIA. |
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1. COLENOSA, Hook. .

A tall erect leafy herb, often woody at the base. Leaves large, alternate, doubly serrate. Flowers large, in terminal racemes. Calyx-tube adnate to the ovary, limb 5-partite. Corolla oblique, curved, split to the base at the back, 2-lipped; upper lip of 2 linear acute lobes, lower of 3 oblong spreading ones. Stamens exserted; filaments pubescent, free for the greater part of their length; anthers cohering into a tube, pilose on the connective and at the

tips. Ovary inferior, 2-celled; ovules numerous, attached to broad peltate placentas; style long; stigma 2-lobed, lobes large, oblong, spreading. Berry globose, thinly fleshy, crowned by the persistent calyx-lobes, indehiscent. Seeds numerous, subglobose, tuberculate.

A genus of a single species, endemic in the northern portion of the North Island. It is very closely allied to *Pratia*, differing chiefly in the tall erect habit, in the racemose inflorescence, and in the large stigmatic lobes.

1. **C. physaloides**, Hook. f. *Fl. Nov. Zel.* i. 157. — Stem flexuose, smooth, sparingly branched, 1–4 ft. high. Leaves on slender petioles 2–5 in. long; blade 3–7 in. long, ovate, acute, unequally doubly serrate, thin and membranous, conspicuously veined, glabrous or with a few sparse soft hairs. Racemes terminal, 5–15-flowered, shorter than the leaves; pedicels slender, bracteolate at the base. Corolla $1\frac{1}{2}$ –2 in. long, pale-blue, pubescent. Berry $\frac{1}{2}$ in. diam., bluish, coriaceous.—*Handb. N.Z. Fl.* 170; *Bot. Mag.* t. 6864. *Lobelia physaloides*, A. Cunn. *Precur.* n. 425; *Raoul, Choix*, 45; *Hook. Ic. Plant.* t. 555, 556.

NORTH ISLAND: From the Three Kings Islands and the North Cape southwards to the Bay of Islands, not common, A. Cunningham, Colenso! &c.; Sail Rock (off Whangarei Harbour), Miss Shakespear! *Öru.* December–March.

2. PRATIA, Gaud.

Slender prostrate or creeping herbs, rarely ascending or erect. Leaves alternate, toothed. Peduncles axillary, 1-flowered. Flowers rather small, often unisexual. Calyx-tube adnate to the ovary, limb 5-partite. Corolla oblique, split to the base at the back, 2-lipped; upper lip 2-partite, lower lip 3-lobed, spreading. Staminal tube free from the corolla or nearly so; anthers cohering, 2 lower tipped with short bristles, 3 upper naked. Ovary 2-celled; ovules numerous; stigma 2-lobed or emarginate. Berry globose or obovoid, crowned by the persistent calyx-lobes, indehiscent. Seeds numerous, minute.

A small genus of 16 or 18 species, having its headquarters in Australia, but extending northwards to the Himalaya Mountains and eastwards to New Zealand and temperate South America. It only differs from *Lobelia* in the indehiscent more or less succulent fruit.

Stems usually long. Leaves $\frac{1}{2}$ – $\frac{1}{2}$ in., orbicular or obovate, obtusely toothed	1. <i>P. angulata</i> .
Stems short, densely matted. Leaves $\frac{1}{12}$ – $\frac{1}{10}$ in., oblong, deeply toothed	2. <i>P. perpusilla</i> .
Stems stout, matted. Leaves $\frac{1}{2}$ – $\frac{1}{3}$ in., coarsely sharply toothed, coriaceous. Corolla-tube cylindrical, swollen below	3. <i>P. macrodon</i> .

1. **P. angulata**, Hook. f. *Fl. Antarct.* i. 43.—A very variable slender creeping or prostrate much-branched perennial herb, glabrous or rarely slightly pubescent; stems 2–12 in. long, branches often ascending at the tips. Leaves shortly petiolate, $\frac{1}{6}$ – $\frac{1}{2}$ in. long

orbicular or ovate-oblong to obovate, obtusely sinuate-dentate, membranous or rather fleshy. Peduncles variable in length, $\frac{1}{2}$ –4 in., slender, erect. Flowers $\frac{1}{3}$ – $\frac{2}{3}$ in. long, white with purple streaks. Calyx-tube oblong; lobes narrow-triangular. Corolla-tube short, the 3 lower lobes spreading, the 2 upper rather smaller and narrower, ascending. Anthers glabrous, the 2 lower ones tipped with minute bristles. Berry globose or broadly ovoid, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., purplish-red. Seeds numerous.—*Fl. Nov. Zel.* i. 157; *Handb. N.Z. Fl.* 172. *Lobelia angulata*, *Forst. Prod.* n. 309; *A. Rich. Fl. Nouv. Zel.* 227; *A. Cunn. Precur.* n. 422; *Raoul, Choix*, 45. *L. littoralis*, *R. Cunn. ex A. Cunn. Precur.* n. 423. *L. rugulosa*, *R. Grah. in Edinb. N. Phil. Journ.* (Oct.–Dec., 1829) 186.

Var. *arenaria*, *Hook. f. Fl. Nov. Zel.* i. 157.—Leaves larger, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., obscurely toothed. Peduncles very short.—*P. arenaria*, *Hook. f. Fl. Antarct.* i. 41, t. 29.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common in damp situations throughout, ascending to 4500 ft. **Var. *arenaria***: AUCKLAND ISLANDS and ANTIPODES ISLAND, also in the extreme south of the South Island. November–February.

2. ***P. perpusilla***, *Hook. f. Handb. N.Z. Fl.* 172.—A minute creeping and rooting perennial herb, forming matted patches 1–4 in. diam.; stems branched, wiry, stout for the size of the plant. Leaves minute, sessile or nearly so, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, oblong or oblong-ovate, obtuse or acute, deeply toothed, rather thick and fleshy, wrinkled or pitted when dry, glabrous or more or less clothed with short bristly hairs. Flowers $\frac{1}{4}$ in. long, on short axillary peduncles or almost sessile. Calyx-tube short, usually hairy; lobes subulate-lanceolate, recurved. Corolla-lobes narrow, almost equal, acute, the 2 upper ones ascending. Anthers glabrous or with a few scattered hairs on the back, the 2 lower tipped with a minute bristle. Fruit not seen.—*Lobelia perpusilla*, *Hook. f. Fl. Nov. Zel.* i. 158.

NORTH ISLAND: Lower Waikato, *H. Carse*! Lake Whangape, *T. F. C.*; outlet of Lake Taupo, *Petrie*! Lake Waikaremoana, *A. Hamilton*! Hawke's Bay, *Colenso*! *Bishop Williams*! near Opunake, *T. Kirk*! November–January.

Probably not uncommon, but easily overlooked. I have seen no specimens from the South Island. In the absence of fruit it is impossible to be certain of the genus, but the habit is more that of *Pratia* than of *Lobelia*.

3. ***P. macrodon***, *Hook. f. Handb. N.Z. Fl.* 172.—A small perfectly glabrous rather fleshy creeping and rooting perennial herb; stems stout, branched, 1–4 in. long, often forming matted patches. Leaves very shortly petioled or almost sessile, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, broadly obovate or orbicular or broader than long, cuneate at the base, deeply and coarsely 4–8-toothed, thick and coriaceous, quite

glabrous. Flowers on very short axillary peduncles or almost sessile, large, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, pale-yellow, sweet-scented. Calyx-tube broadly turbinate; lobes narrow-triangular. Corolla $\frac{1}{3}$ – $\frac{1}{2}$ in. long; tube very long, cylindrical, swollen at the base; lobes short, spreading or recurved. Anthers glabrous, the 2 lower each tipped with a flat rigid bristle with some smaller ones at its base. Berry globose, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Seeds very numerous, minute.

SOUTH ISLAND: Nelson—Gordon's Nob, Raglan Mountains, Wairau Gorge, *T. F. C.*; Acheron and Clarence Valleys, *Travers*; Mount Murchison, *W. Townson*! Mount Percival, *T. F. C.* Canterbury—Mount Torlesse, *Haast*! *Enys*! *Petrie*! *T. F. C.*; mountains at the head of the Broken River, *Enys*! Arthur's Pass and Waimakariri Glacier, *Kirk*! *T. F. C.* Otago—Mount Cardrona and the Hector Mountains, *Petrie*! 3000–5500 ft. December–February.

A very distinct species, at once recognised by the long cylindrical corolla-tube.

3. LOBELIA, Linn.

Herbs of very various habit, or (in species not found in New Zealand) rarely shrubs. Leaves alternate, toothed, seldom entire. Flowers axillary and solitary, or in terminal racemes. Calyx-tube adnate to the ovary; limb 5-partite. Corolla oblique, split to the base at the back, 2-lipped; upper lip 2-partite, usually erect, lower 3-lobed, spreading. Staminal tube free from the corolla or rarely adnate to it at the very base; anthers connate, all or the 2 lower only tipped with bristles. Ovary 2-celled; ovules numerous; style filiform; stigma shortly bifid, often surrounded by a ring of hairs. Capsule 2-celled, opening loculicidally within the calyx-lobes into 2 valves. Seeds usually numerous, minute.

A large genus of over 200 species, rare in Europe and Western Asia, abundant in most other regions except the very coldest.

- | | | |
|--|-------|---------------------------|
| Stems 6–18 in., erect or decumbent. Leaves linear to obovate. Capsule linear-clavate | .. .. | 1. <i>L. anceps</i> . |
| Stems 1–6 in., creeping and rooting. Leaves $\frac{1}{2}$ – $\frac{1}{4}$ in., obovate to orbicular, sinuate-dentate. Capsule oblong-obovoid | .. .. | 2. <i>L. linnæoides</i> . |
| Stems 2–5 in., tortuous among shingle. Leaves $\frac{1}{2}$ –1 in., orbicular-obovate, deeply toothed or lobed. Capsule large, broadly ovoid | .. .. | 3. <i>L. Roughii</i> . |

1. *L. anceps*, *Linn. f. Suppl.* 395.—An erect or decumbent much or sparingly branched leafy herb, everywhere perfectly glabrous. Stems 6–18 in. long, flattened or angular or trigonous, sometimes winged. Leaves very variable in shape and size, 1–3 in. long, the lower ones usually linear-obovate or obovate, gradually narrowed into decurrent petioles, the upper lanceolate or ligulate, gradually passing into the floral leaves, which are smaller, sessile and linear, all sparingly toothed or nearly entire. Flowers small, on short axillary peduncles. Calyx-tube cylindrical, much longer

than the short triangular lobes. Corolla pale-blue, $\frac{1}{4}$ in. long. Capsule elongated, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, linear-clavate.—*Hook. f. Fl. Nov. Zel.* i. 158; *Handb. N.Z. Fl.* 171; *Benth. Fl. Austral.* iv. 128. *L. alata*, *Labill. Pl. Nov. Holl.* i. 51, t. 72; *A. Rich. Fl. Nouv. Zel.* 227; *A. Cunn. Precur.* n. 421; *Raoul, Choix*, 44.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Common in lowland districts as far south as Oamaru and Okarito. November–March.

A very variable plant. Maritime specimens usually have larger, broader, and more succulent leaves than those found inland, and often present a very distinct appearance.

2. *L. linnæoides*, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 405.—A small creeping and rooting perennial herb; stems slender, glabrous, sparingly branched, 1–6 in. long. Leaves very shortly petiolate or almost sessile, $\frac{1}{6}$ – $\frac{1}{4}$ in. diam., orbicular or ovate-orbicular, coarsely sinuate-dentate, rather thick and coriaceous, often purplish beneath, glabrous or with minute bristly hairs above. Peduncles slender, erect, axillary, 1-flowered, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long. Flowers $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Calyx-lobes small, narrow-triangular, $\frac{1}{12}$ in. long. Corolla $\frac{1}{8}$ in. long, the lower lobes obovate, apiculate; the upper narrower, linear-oblong, acute. Anthers glabrous, the 2 lower ones tipped with minute flat bristles. Capsule $\frac{1}{4}$ – $\frac{1}{3}$ in. long, narrow obovoid-oblong, straight. Seeds small, smooth.—*Pratia(?) linnæoides*, *Hook. f. Handb. N.Z. Fl.* 172.

SOUTH ISLAND: Canterbury—Ashburton Mountains, *T. H. Potts*! Macaulay River, *Haast*; Lake Ohau, *Buchanan*! Otago—Lindis Pass, *Hector* and *Buchanan*; Mount Cardrona, Mount Pisa, Hector Mountains, Mount Tyndall, Mount Bonpland, &c., *Petrie*! 2500–4500 ft. December–February.

3. *L. Roughii*, *Hook. f. Handb. N.Z. Fl.* 171.—A small perfectly glabrous perennial herb 2–5 in. high, full of white acrid fluid. Stems very slender, creeping, branched, tortuous among shingle; branches short, leafy at the tips. Leaves alternate, $\frac{1}{2}$ –1 in. long; blade broadly oblong or obovate to orbicular, narrowed into a broad flat petiole, coarsely and deeply toothed or lobed with a rounded sinus between the teeth, thick and coriaceous; main veins 5–7, spreading from the base of the leaf. Peduncles stout, erect, axillary, 1-flowered; at first shorter than the leaves, but lengthening as the fruit ripens, and sometimes reaching 2 in. or more. Flowers $\frac{1}{2}$ in. long. Calyx globose; lobes linear, obtuse, coriaceous, lengthening as the fruit ripens. Corolla equalling the calyx-lobes, 3-lipped; the two dorsal petals (upper lip) being free from one another to the base; lower lip 3-lobed about $\frac{1}{3}$ way down. Anthers glabrous. Capsule $\frac{1}{3}$ – $\frac{1}{2}$ in. long, broadly ovoid, coriaceous. Seeds very numerous.—*Buch. in Trans. N.Z. Inst.* xiv. (1882) 347, t. 28, f. 1.

SOUTH ISLAND: Shingle slopes on the mountains, not common. Nelson—Dun Mountain, *Rough*; Wairau Gorge, *Travers*, *T. F. C.*; Waiau Valley, *Travers*. Canterbury—Mount Torlesse, *Petrie*! *T. F. C.*; mountains near the Broken River, *Enys*! *T. F. C.*; Mount Dobson, *T. F. C.*; mountains at the head of Lake Ohau, *Buchanan*! Otago—Mount Ida, Mount St. Bathans, Mount Kyeburn, *Petrie*! 3000-6000 ft. December-March.

A most distinct species, quite unlike any other. It is remarkable for the corolla being twice split to the base at the back, so that the flower is 3-lipped.

4. ISOTOMA, Lindl.

Herbs of various habit. Leaves alternate, entire or toothed or pinnatifid. Flowers axillary or in terminal racemes. Calyx-tube adnate to the ovary; limb 5-partite. Corolla-tube cylindrical, entire or very shortly slit on the upper side; limb spreading, with 5 nearly equal lobes. Stamens inserted about the middle of the corolla-tube; filaments connate above; anthers similar to those of *Lobelia*, the 2 lower ones tipped with one or several short bristles, the 3 upper naked. Ovary 2-celled; ovules numerous; stigma shortly 2-lobed. Capsule 2-celled, loculicidally 2-valved within the calyx-lobes. Seeds numerous.

A small genus of 6 or 8 species, most of them natives of Australia. It differs from *Lobelia* in the corolla-tube not being split to the base at the back, and in the stamens being affixed to the middle of the tube. The single species found in New Zealand is plentiful in south-east Australia and Tasmania.

1. *I. fluviatilis*, *F. Muell. ex Benth. Fl. Austral.* iv. 136.—A small slender creeping and rooting perennial herb, often forming matted patches, glabrous or slightly pubescent; stems 1-4 in. long. Leaves shortly petiolate, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, oblong or obovate-oblong to linear-oblong, obtuse or subacute, entire or sinuate-dentate, rather thin and membranous. Peduncles axillary, 1-flowered, longer than the leaves. Flowers pale-blue, $\frac{1}{4}$ - $\frac{1}{3}$ in. long. Calyx-lobes subulate-lanceolate. Corolla-tube not split at the back, longer than the calyx-lobes; lobes linear-oblong, spreading. Stamens attached to the corolla-tube about the middle; the 2 lower anthers each tipped with a rigid bristle. Capsule oblong, $\frac{1}{3}$ in. long. Seeds smooth.—*Lobelia fluviatilis*, *R. Br. Prodr.* 563; *Hook. f. Fl. Tasm.* i. 238, t. 70.

SOUTH ISLAND: Nelson—Lower portion of the Buller Valley and marshy places near Westport, *W. Townson*! Mokohinou River, *Rev. F. H. Spencer*! Canterbury—Broken River basin, *Enys*! *Kirk*! *T. F. C.*; Lake Tekapo, *T. F. C.* Otago—Macrae's, *Petrie*! Sea-level to 3000 ft. December-February.

Probably an abundant mountain plant. In the absence of fruit it has been for many years confused with small forms of *Pratia angulata*, both in my own herbarium and in *Kirk's* and *Petrie's*, although the entire corolla-tube and epicorolline stamens ought to have been sufficient to indicate its proper position.

5. WAHLENBERGIA, Schrad.

Annual or perennial herbs. Leaves alternate or rarely opposite. Peduncles terminal or axillary, often forming leafy panicles.

Flowers usually blue or white. Calyx-tube adnate to the ovary; limb 5-partite, rarely 3-4- or 6-7-partite. Corolla regular, campanulate or more or less tubular at the base; lobes as many as the divisions of the calyx, valvate. Stamens free from the corolla; filaments often dilated at the base; anthers oblong, free. Ovary 2-5-celled; ovules numerous; style cylindric; stigma 2-5-fid. Capsule 2-5-celled, opening loculicidally within the calyx-lobes with 2-5 valves. Seeds numerous, small.

A large genus of about 80 species, most numerous in South Africa, but not uncommon in other parts of the Southern Hemisphere; rare in the tropics or in the north temperate zone.

- Annual. Stems leafy, usually branched. Leaves never rosulate. Corolla 5-lobed, much longer than the calyx 1. *W. gracilis*.
 Perennial. Leaves rosulate or crowded on the short stems. Corolla 5-lobed, much longer than the calyx .. 2. *W. saxicola*.
 Perennial. Leaves crowded, spatulate, with thick white cartilaginous margins. Corolla 5-partite nearly to the base, altogether included within the calyx-lobes .. 3. *W. cartilaginea*.

1. *W. gracilis*, A. D.C. *Monog. Camp.* 142.—An exceedingly variable annual or rarely perennial herb. Stems slender, angled, 3-24 in. long, erect or decumbent at the base, simple or branched, glabrous or more or less hispid with stiff white hairs. Lower leaves $\frac{1}{2}$ -2 in. long, obovate or spatulate to lanceolate or linear, often narrowed into a more or less distinct petiole, entire or sinuate-toothed; margins often cartilaginous; upper leaves smaller and narrower, sometimes almost subulate, sessile, entire or sinuate. Peduncles slender, terminating the branches, very variable in length. Flowers $\frac{1}{4}$ - $\frac{1}{2}$ in. long, dark or pale blue, sometimes almost white. Calyx-tube from ovoid to narrow-obconic; lobes 3-5, linear from a triangular base. Corolla variable in size, campanulate, 3-5-lobed. Capsule $\frac{1}{4}$ - $\frac{1}{2}$ in. long, oblong or obconic, narrowed into the peduncle. Seeds ellipsoid, compressed, smooth. — A. *Rich. Fl. Nouv. Zel.* 225; A. *Cunn. Precur.* n. 420; Raoul, *Choix*, 44; Hook. f. *Fl. Nov. Zel.* i. 159; *Handb. N.Z. Fl.* 169; Benth. *Fl. Austral.* iv. 137. *Campanula gracilis*, Forst. *Prodr.* n. 84.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Common throughout, ascending to 4000 ft. November-February. Also in Australia and Tasmania, eastern Asia, and southern Africa.

Several varieties have been named, but they run so much into one another that it is hardly possible to satisfactorily define them.

2. *W. saxicola*, A. D.C. *Monog. Camp.* 144.—A small perfectly glabrous perennial herb 2-12 in. high, either simple or with a branched rootstock putting up few or many short erect stems, usually leafy at the base only. Leaves rosulate or crowded on the short stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, from narrow-obovate to oblanceolate or almost linear, obtuse or acute, narrowed into a short petiole,

entire or obscurely toothed or crenate, in alpine specimens often thick and coriaceous; margins sometimes white and cartilaginous. Peduncles leafless, 1-flowered, 2-8 in. high. Flowers variable in size, $\frac{1}{3}$ -1 in. diam., white or pale-blue. Calyx-tube obconic; lobes ovate-subulate, shorter than the corolla-tube. Corolla campanulate, 5-lobed, straight or slightly oblique. Anthers short, linear-oblong, 1 or 2 of them tipped with a short point. Capsule obconic or turbinate, 2-3-celled. Seeds numerous, compressed, smooth.—*Hook. f. Fl. Nov. Zel.* i. 160; *Handb. N.Z. Fl.* 170; *Fl. Tasm.* i. 239, t. 71; *Bot. Mag.* t. 6613; *Benth. Fl. Austral.* iv. 138. *W. albomarginata*, *Hook. Ic. Plant.* t. 818. *W. pygmæa*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 273. *Streleskia montana*, *Hook. f. in Hook. Lond. Journ. Bot.* vi. (1847) 266. *Campanula saxicola*, *R. Br. Prodr.* 561.

Var. congesta.—Stems creeping, much branched and interlaced, forming densely matted patches several inches in diam. Leaves $\frac{1}{2}$ -1 in. long, orbicular or oblong-spathulate, suddenly narrowed into a petiole often longer than the blade. Peduncles short, $\frac{3}{4}$ -2 in. long. Flowers $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., pale-blue. Capsule globose, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in hilly and mountainous situations from the East Cape and Taupo southwards. *Var. congesta*: Cape Foulwind, near Westport, *W. Townson*! Sea-level to 6000 ft. December-February.

Almost as variable as the preceding. There are two chief forms, one rather larger, with broad thinnish leaves, a long peduncle, and handsome large white flowers; the other smaller, with usually narrower and more coriaceous leaves and smaller blue flowers. Mr. Townson's plant from Cape Foulwind, which forms broad densely matted patches in sandy soil, has a very distinct appearance, and almost deserves specific rank.

3. W. cartilaginea, *Hook. f. Handb. N.Z. Fl.* 170.—A small glabrous or pubescent perennial herb 1-4 in. high. Leaves mostly radical, $\frac{1}{3}$ -1 in. long, broadly spathulate, obtuse, very thick and coriaceous; margins much thickened, entire, white, cartilaginous; petioles broad and flat, thickly coriaceous. Peduncles short, stout, erect, naked or with 1 or 2 leaves, sometimes forked. Flower large for the size of the plant, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., sweet-scented. Calyx-tube short, almost globose; lobes large, linear-oblong, with thick white cartilaginous margins. Corolla shorter than the calyx-lobes and included within them, broad, 5-partite almost to the base. Capsule turbinate.

SOUTH ISLAND: Nelson—Wairau Gorge, *Rough*! *Kirk*! *Tarndale*, *Sinclair*! Clarence and Wairau Valleys, *Travers*. 3500-6000 ft. January.

A very remarkable species, easily distinguished by the broad and thick cartilaginous margins to the leaves, large calyx-lobes, and small deeply divided corolla, which is altogether included within the calyx. It is apparently rare and local, and I have only seen very indifferent specimens.

ORDER XLII. ERICACEÆ.

Shrubs or small trees, sometimes low and creeping. Leaves usually alternate, sometimes opposite or whorled, rigid, simple, entire or serrate; stipules wanting. Flowers regular, hermaphrodite. Calyx inferior, 4-5-toothed or -cleft. Corolla gamopetalous, hypogynous, regular, often campanulate or urceolate, 4-5-toothed or -lobed (in some exotic genera divided into 4-5 free petals). Stamens usually double the number of the corolla-lobes, rarely the same number, hypogynous or sometimes adnate to the base of the corolla; filaments free; anthers 2-celled, opening by terminal pores or slits, often furnished with appendages. Ovary superior, 4-5-celled; style simple, terminal; stigma capitate, entire or shortly lobed; ovules usually many, attached to the inner angle of the cell or pendulous from the top of the angle. Fruit a capsule or berry, sometimes enclosed in the enlarged and succulent calyx (*Gaultheria*). Seeds usually numerous, small; albumen fleshy; embryo straight, axile.

A large order, widely spread over the whole world, especially in temperate and cool regions, but singularly rare in Australia and New Zealand, where its place is taken by the allied family *Epacrideæ*. In the tropics it is principally found on high mountains. Genera between 50 and 60; species not far from 1200. The properties of the order are unimportant, but it contains some of the most beautiful shrubs cultivated in gardens, as the various kinds of *Rhododendron*, *Azalea*, *Erica*, *Arbutus*, &c. Of the two genera found in New Zealand, *Gaultheria* has a wide range in Asia and America, and is also found in Australia; *Pernettya* is principally South American, but occurs in Tasmania as well.

Fruit dry, capsular, usually enclosed in the enlarged and succulent calyx

1. GAULTHERIA.

Fruit a berry, calyx persistent at its base, but not fleshy nor enlarged

2. PERNETTYA.

1. GAULTHERIA, Kahn.

Erect or procumbent shrubs, often hispid or strigose. Leaves persistent, alternate, usually serrate or serrulate, coriaceous. Flowers small, racemose or axillary and solitary. Calyx 5-lobed or -partite, in fruit usually enlarged and more or less succulent and coloured. Corolla urceolate or campanulate, 5-lobed; lobes imbricate, spreading or recurved. Stamens 10, included within the corolla-tube; filaments more or less dilated; anthers 2-celled, each cell opening by a terminal or oblique pore and tipped with 2 erect awns. Ovary 5-celled, with several ovules in each cell; style cylindric; stigma simple. Capsule 5-celled, loculicidally 5-valved, included in the usually enlarged and succulent calyx. Seeds numerous, minute, subglobose or obtusely angled.

A genus of nearly 100 species, mainly American, stretching from Oregon to Cape Horn, a few found in Australia and New Zealand, some in India and the Malay Archipelago, and one in Japan. In the New Zealand species the calyx is sometimes enlarged and succulent and sometimes dry and unaltered when the

fruit is ripe, and occasionally the capsule may be slightly succulent, thus breaking down the distinction between *Pernettya* and *Gaultheria*. One of the species extends to Tasmania, the remainder are endemic.

* Leaves alternate. Flowers axillary, the tips of the branches sometimes forming leafy racemes

Stems erect or prostrate. Leaves very variable, orbicular to linear-oblong 1. *G. antipoda*.
Stems slender, flexuous, often intertwined. Leaves linear-lanceolate 2. *G. perplexa*.

** Leaves alternate. Flowers in axillary and terminal racemes.

Leaves oblong-lanceolate to broad-oblong 3. *G. rupestris*.
Leaves ovate oblong, cordate at the base 4. *G. fagifolia*.

*** Leaves opposite. Flowers in axillary and terminal often compound racemes.

Leaves ovate or ovate-oblong, cordate at the base, sessile.. 5. *G. oppositifolia*.

1. *G. antipoda*, Forst. *Prodr.* n. 196.—An erect or prostrate much or sparingly branched rigid shrub, very variable in size and habit, on the mountains frequently only a few inches high, in lowland situations 2–4 ft. or more. Branches stout, sometimes glabrous, but usually more or less clothed with blackish or yellow-brown bristles intermixed with a short and fine white pubescence. Leaves alternate, shortly petiolate, variable in size, in large-leaved forms $\frac{1}{3}$ – $\frac{2}{3}$ in., in dwarfed mountain states $\frac{1}{6}$ – $\frac{1}{3}$ in., orbicular or broadly oblong to oblong-lanceolate or linear-lanceolate, obtuse or acute, bluntly serrate, very thick and coriaceous, conspicuously veined, glabrous except the petioles, which are hispid-pubescent. Flowers small, white or red, axillary and solitary, often crowded at the ends of the branches, which thus form leafy racemes; peduncles short, curved, bracteolate, pubescent. Calyx 5- or rarely 6-lobed; lobes ovate-oblong, acute. Corolla $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Capsule usually included in the enlarged and succulent calyx-lobes, forming a red or white globose berry-like fruit $\frac{1}{2}$ in. diam., but frequently the lobes remain dry and unaltered.—*A. Rich. Fl. Nov. Zel.* 211, t. 28; *A. Cunn. Precur.* n. 417; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 161; *Handb. N.Z. Fl.* 174.

Var. **erecta**.—Erect, much branched. Leaves large, $\frac{1}{2}$ – $\frac{3}{4}$ in., broadly oblong or orbicular.—*G. epiphyta*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 474.

Var. **fluviatilis**, *Hook. f. Fl. Nov. Zel.* i. 161.—Erect, virgately branched. Leaves large, $\frac{1}{3}$ – $\frac{2}{3}$ in., oblong-lanceolate or lanceolate. Flowers small, almost racemed, on longer and more slender pedicels.—*G. fluviatilis*, *A. Cunn. Precur.* n. 419.

Var. **depressa**, *Hook. f. l.c.*—Depressed or prostrate; branches creeping and rooting at the base, clothed with fulvous bristles. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., orbicular to elliptical or oblong. Flowers axillary. Berry large, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.—*Fl. Tasm.* i. 241, t. 73A. *G. depressa*, *Hook. f. in Lond. Journ. Bot.* vi. (1847) 267.

Var. **microphylla**, Hook. f. l.c.—Small, prostrate, sparingly branched. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in. long, ovate to linear-lanceolate.—*Pernettya macrostigma*, Col. in *Trans. N.Z. Inst.* xxi. (1889) 92.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: The first two varieties abundant throughout, the second two in mountain districts from the East Cape southwards. Sea-level to 6000 ft.

A variable plant in most of its characters, particularly in the fruiting calyx, which may be greatly enlarged, highly coloured, and succulent, or may remain dry and unaltered. Both succulent and dry calyces may be found on the same branch. The variety *depressa* is also found on the Tasmanian mountains.

2. **G. perplexa**, T. Kirk in *Trans. N.Z. Inst.* xxix. (1897) 538 (name only).—A small suberect or prostrate bush 1–3 ft. high, rarely more; branches flexuous, often much and closely interlaced; bark dark red-brown; branchlets clothed with short white pubescence intermixed with long erect or spreading yellow-brown bristles. Leaves alternate, spreading, very shortly petiolate; $\frac{1}{4}$ – $\frac{1}{2}$ in. long, lanceolate or linear-lanceolate or linear, often curved, acute or acuminate, serrate, the teeth usually bristle-pointed, thick and coriaceous, quite glabrous. Flowers small, solitary and axillary, often crowded at the ends of the branches; peduncles short, bracteolate, curved. Calyx-lobes minutely ciliate. Corolla broadly urceolate, $\frac{1}{10}$ in. long. Capsule usually included in the enlarged and fleshy calyx-lobes, forming a berry-like fruit $\frac{1}{2}$ in. in diam., but frequently the calyx remains dry and unchanged.—*G. antipoda* var. *ciliata*, Hook. f. *Fl. Nov. Zel.* i. 161; *Handb. N.Z. Fl.* 175.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in hilly and mountainous districts from Lake Taupo southwards. Sea-level to 3500 ft.

A very puzzling plant, in its usual state presenting a most distinct appearance, but there are intermediate forms which connect it with the variety *microphylla* of *G. antipoda*.

3. **G. rupestris**, R. Br. *Prodr.* 559.—An erect or more rarely procumbent or prostrate much-branched shrub varying in height from a few inches to 3 or 4 ft., sometimes attaining 5 to 6 ft. or more; branches stout, glabrous or slightly pubescent, occasionally setose. Leaves close-set, alternate, shortly petiolate, very variable in size and shape, $\frac{1}{3}$ –2 in. long, from oblong or elliptic-lanceolate to oblong or oblong-ovate or almost orbicular, acute or obtuse, crenulate or serrulate, very thick and coriaceous, reticulated on both surfaces, often shining above, quite glabrous. Racemes axillary and terminal, often crowded towards the ends of the branches, simple or branched, few- or many-flowered, $\frac{1}{4}$ –2 in. long; pedicels longer or shorter than the bracteoles. Flowers white. Calyx-lobes ovate, acute, ciliate, usually remaining unaltered in fruit, although baccate specimens are not uncommon.—*A. Cunn. Precur.* n. 418; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 161, t. 42; *Handb.*

N.Z. Fl. 175. *G. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 162. *G. divergens*, *Col. in Trans. N.Z. Inst.* xx. (1888) 198. *G. subcorymbosa*, *Col. l.c.* xxii. (1890) 476. *G. glandulosa*, *Col. l.c.* xxviii. (1896) 600. *G. calycina*, *Col. l.c.* xxxi. (1899) 274. *Andromeda rupestris*, *Forst. Prodr.* n. 195; *A. Rich. Fl. Nouv. Zel.* 208, t. 27.

A highly variable plant, the numerous forms of which are best arranged under two heads, as under:—

Var. **lanceolata**.—Leaves large, oblong-lanceolate or obovate-lanceolate, acute, branches glabrous or more or less pubescent or setose.

Var. **parvifolia**.—Leaves smaller and broader, oblong or oblong-ovate to orbicular-ovate; branches glabrous or rarely pubescent.

NORTH AND SOUTH ISLANDS: Not uncommon in hilly and mountainous districts from the Thames goldfields southwards. Sea-level to 5000 ft. November–February.

Some forms of this come very close to *G. antipoda* in foliage, but can always be distinguished by the truly racemose inflorescence.

4. ***G. fagifolia***, *Hook. f. Fl. Nov. Zel.* i. 162.—An erect much-branched shrub 4–5 ft. high; branches spreading or ascending, rigid, younger ones more or less setose. Leaves alternate or subopposite, shortly petiolate, $\frac{1}{2}$ –1 in. long, oblong or ovate-oblong to broadly ovate, acute or subacute, cordate at the base, crenate-serrate, very thick and coriaceous, both surfaces finely reticulated, quite glabrous. Racemes axillary and terminal, $\frac{1}{2}$ –2 in. long, sometimes compound. Flowers white. Calyx-lobes ovate, acute, remaining unaltered in all the fruiting specimens I have seen.—*Handb. N.Z. Fl.* 175.

NORTH ISLAND: Near Rotorua, *Rev. F. H. Spencer*! Rotokakahi, *G. Mair*! Motukino, near Lake Taupo, *Colenso*! *Kirk*! 1000–2000 ft. January.

This appears to me to be a mere form of *G. rupestris* verging towards *G. oppositifolia*, or possibly a hybrid between the two plants.

5. ***G. oppositifolia***, *Hook. f. Fl. Nov. Zel.* i. 162, t. 43.—A much-branched shrub 2–8 ft. high; branches spreading, glabrous or sparingly setose. Leaves opposite, sessile or nearly so, sometimes stem-clasping, $1\frac{1}{2}$ –2 $\frac{1}{2}$ in. long or more, ovate or oblong-ovate, acute or obtuse, cordate at the base, crenate-serrate, very thick and coriaceous, both surfaces finely reticulated, glabrous or sparingly minutely setulose. Racemes axillary and terminal, the latter often compound, forming broad terminal panicles 2–4 in. long, with opposite spreading branches. Flowers very numerous, white, about $\frac{1}{6}$ in. long. Calyx-lobes ovate-triangular, acute, remaining unaltered in all the fruiting specimens I have seen. Capsule dry.—*Handb. N.Z. Fl.* 175. *G. multibracteolata*, *Col. in Trans. N.Z. Inst.* xxiv. (1892) 389.

NORTH ISLAND: Abundant from Matamata, in the Upper Thames Valley, to Rotorua, the Upper Waikato, and Taupo, *Capt. G. Mair!* *Kirk!* *Petrie!* *T. F. C.*; cliffs between Hawke's Bay and Taupo, *Colenso*; East Cape, between Whangaparaoa and Hicks Bay, *Bishop Williams!* near Wanganui, *H. C. Field!* 500-3500 ft. November-January.

A very handsome plant, easily recognised by the large opposite leaves, which are sessile and cordate at the base, and by the usually paniced racemes.

2. *PERNETTYA*, Gaud.

Glabrous or hispid rigid shrubs, usually of small size. Leaves small, alternate, shortly petiolate, penniveined, serrate. Flowers small, axillary and solitary or racemose. Calyx 5-partite, not enlarged and succulent in fruit. Corolla urceolate or almost globose, shortly 5-lobed; lobes recurved. Stamens 10, included within the corolla-tube; filaments dilated at the base; anthers 2-celled, dehiscing by a large terminal pore, cells each with 2 erect awns. Ovary 5-lobed and 5-celled; ovules several in each cell; style cylindrical; stigma simple. Berry globose, 5-celled. Seeds numerous, minute, compressed.

A genus comprising about 15 species, all American except the one described below and a closely allied one from the mountains of Tasmania.

Pernettya macrostigma, Col. in *Trans. N.Z. Inst.* xxi. (1889) 92, is shown by the type specimens in Mr. Colenso's herbarium to be *Gaultheria antipoda* var. *microphylla*. In like manner, *P. polyphylla*, Col. l.c. xxxi. (1899) 274, is identical with *Pentachondra pumila*.

1. *P. nana*, Col. in *Trans. N.Z. Inst.* xxiii. (1891) 389.—A small creeping densely matted little shrub; branches short, ascending, $\frac{1}{2}$ -3 in. high, rarely more, minutely puberulous towards the tips. Leaves very shortly petiolate, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, oblong-lanceolate to oblong, acute or subacute, very thick and coriaceous, glabrous or very minutely puberulous, entire or with 2-3 indistinct teeth on each side. Flowers 2-4 near the tips of the branches, solitary, axillary, about $\frac{1}{8}$ in. long; peduncles short, 2-3-bracteolate. Calyx-lobes ovate-triangular, acute, ciliate. Corolla broadly urceolate. Stamens reaching above the base of the corolla-lobes; filaments 4 or 5 times as long as the anthers, gradually dilated downwards. Anthers oblong, each cell tipped with 2 short bristles. Style cylindrical, equalling the stamens in length; stigma minutely 5-toothed. Berry globose-depressed, seated in the persistent calyx, which is sometimes slightly enlarged and fleshy.—*P. tasmanica*, *Hook. f. Handb. N.Z. Fl.* 176, but not of *Fl. Tasm.* i. 242, t. 73, *B. P. tasmanica* var. *neo-zealandica*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 351.

SOUTH ISLAND: Canterbury—By the Porter River and in other places in the Broken River basin, *Enys!* *Kirk!* *T. F. C.*; Southern Alps, *J. F. Armstrong!* Mount Cook district, *Suter!* *T. F. C.*; Hopkins River, *Haast*. Otago—Hector Mountains and Mount Bonpland, *Petrie!* 2000-5000 ft. December-February.

This was referred to *P. tasmanica* by Hooker, but it appears to constantly differ from that plant in the rather broader leaves, acute triangular calyx-lobes, longer filaments, which equal or exceed the style in length, and especially in the anther-cells having 2 minute awns at the tip, in this respect agreeing with the American species of the genus.

ORDER XLIII. EPACRIDEÆ.

Shrubs or rarely small trees. Leaves alternate, seldom opposite, often crowded or imbricate, rigid, entire or sometimes serrulate, often longitudinally nerved; stipules wanting. Flowers regular, hermaphrodite, axillary or terminal, solitary or in spikes or racemes. Calyx inferior, 4-5-partite, or of 4-5 free sepals; divisions persistent, coriaceous, striate, imbricate. Corolla gamopetalous, hypogynous, 4-5-lobed or -partite. Stamens 4-5, hypogynous or inserted on the tube or throat of the corolla; anthers 1-celled, opening longitudinally for their whole length. Disc surrounding the base of the ovary, cup-shaped or annular, 5-lobed or of 5 separate scales. Ovary superior, 1-10-celled but usually 5-celled; style simple, stigma usually capitate; ovules 1 or many in each cell, anatropous. Fruit either a drupe with 2-5 1-seeded pyrenes or a many-seeded capsule with loculicidal dehiscence. Seeds small, albuminous; embryo straight, axile, radicle next the hilum.

A small order, mainly separated from *Ericaceæ* by the 1-celled anthers with longitudinal dehiscence. It is almost wholly confined to Australia and New Zealand, a few species only being found in the Pacific islands and the Malay Archipelago, and one in temperate South America. Genera 26; species about 325. The properties of the order are unimportant, but many of the species are well worth cultivation from the beauty of their flowers. All the New Zealand genera are found in Australia.

* Ovules solitary in each cell of the ovary. Fruit a drupe.

Fruit with 5 distinct pyrenes	1. PENTACHONDRA.
Fruit with a 5-celled hard endocarp. Pedicels with numerous imbricating bracts	2. CYATHODES.
Pedicels with few bracts	3. LEUCOPOGON.

** Ovules numerous in each cell. Fruit a capsule.

Leaves usually petiolate, not sheathing. Bracts numerous, imbricate, passing into the calyx	4. EPACRIS.
Leaves petiolate, not sheathing. Bracts few, deciduous	5. ARCHERIA.
Leaves narrow, with broad sheathing bases	6. DRACOPHYLLUM.

1. PENTACHONDRA, R. Br.

Spreading or prostrate shrubs. Leaves usually crowded, ovate-oblong or linear, striate. Flowers solitary or few together at the tips of the branches, axillary, on short peduncles. Bracts several, small, the uppermost with the rudiment of a second flower; bracteoles appressed to the calyx. Calyx 5-partite. Corolla-tube very short; lobes 5, revolute or recurved, bearded inside. Stamens

5, filaments inserted near the top of the corolla-tube, long or short; anthers exserted or included. Hypogynous scales free or connate. Ovary 5-celled; style long or short; stigma small; ovules solitary, pendulous from the top of the cell. Fruit a baccate drupe with 5 (or more) distinct 1-seeded pyrenes or nuts, sometimes fewer by abortion.

A small genus of 4 or 5 species, confined to the mountains of Australia, Tasmania, and New Zealand. The single New Zealand species has the range of the genus.

1. *P. pumila*, *R. Br. Prodr.* 549.—A much and closely branched dwarf shrub 2–6 in. high; stems stout, woody, procumbent; branches ascending, glabrous or pubescent. Leaves numerous, crowded, suberect, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, oblong or ovate-oblong, obtuse or with a callous tip, glossy, concave above, 3–7-nerved beneath; margins finely ciliate. Flowers almost sessile, solitary at the tips of the branchlets, about $\frac{1}{4}$ in. long, white or red. Bracts several, small, obtuse; bracteoles much shorter than the calyx. Sepals obtuse, ciliate. Corolla-tube cylindrical, much longer than the calyx; lobes short, recurved, bearded within. Berry rather large, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., globose or broadly pyriform, red; pyrenes quite free, varying in number from 5 to 10, but usually 8.—*A. Rich. Fl. Nouv. Zel.* 217; *A. Cunn. Precur.* n. 410; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 166; *Handb. N.Z. Fl.* 178; *Benth. Fl. Austral.* iv. 164. *P. rubra*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 601. *P. polyphylla*, *Col. l.c.* xxxi. (1899) 274. *Trochocarpa novæ-zealandiæ*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 602. *Epacris pumila*, *Forst. Prodr.* n. 70.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in hilly and mountainous districts from Cape Colville and the East Cape southwards. Chiefly found between 2000 ft. and 5000 ft., but descends to sea-level on Stewart Island. December–February.

2. *CYATHODES*, Labill.

Shrubs, sometimes tall and erect, sometimes low-growing and diffuse or prostrate. Leaves scattered or imbricate, flat or convex, striate, often white beneath. Flowers small, axillary and solitary, on short peduncles; bracts several, imbricating, the uppermost larger and almost concealing the calyx. Calyx 5-partite. Corolla-tube usually longer than the calyx, rarely shorter; lobes 5, spreading or recurved, glabrous or bearded inside. Stamens 5, inserted near the top of the corolla-tube; filaments short, filiform or thickened; anthers oblong or linear, wholly or partly included in the corolla-tube or in the erect base of the lobes. Hypogynous disc cup-shaped or annular, or of 5 free scales. Ovary 3–5-celled (rarely 8–10-celled); style filiform; stigma small; ovules solitary, pendulous from the top of the cells. Fruit a baccate drupe; mesocarp fleshy; endocarp bony, 3–5-celled; cells 1-seeded.

A small genus of about 15 species, scattered through Australia and Tasmania, New Zealand, and the Pacific islands. One of the New Zealand species extends to Australia, the others are endemic.

* Corolla-lobes not bearded inside.

- | | |
|---|-----------------------------|
| A large erect shrub. Leaves $\frac{1}{4}$ – $\frac{3}{8}$ in., narrow-linear, with rigid pungent points | 1. <i>C. acerosa</i> . |
| A large erect shrub. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., linear-oblong, sub-acute, not pungent.. .. . | 2. <i>C. robusta</i> . |
| Small, spreading, prostrate. Leaves $\frac{1}{8}$ – $\frac{1}{5}$ in., linear, obtuse, spreading | 3. <i>C. empetrifolia</i> . |

** Corolla-lobes densely bearded within.

- | | |
|--|-------------------------|
| Sparsely branched, 4–18 in. high. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., linear-oblong, obtuse. Flowers in 3–5-flowered racemes | 4. <i>C. Colensoi</i> . |
| Densely tufted, 2–5 in. Leaves $\frac{1}{8}$ – $\frac{1}{5}$ in., linear-oblong, apiculate. Flowers solitary | 5. <i>C. pumila</i> . |

1. *C. acerosa*, *R. Br. Prodr.* 539.—An erect or rarely decumbent branching shrub 4–15 ft. high or more; bark black; branches woody, spreading. Leaves spreading or reflexed, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, acerose, linear or subulate-lanceolate, rigid, pungent-pointed, glaucous beneath, with from 3 to 7 parallel veins, the outer of which often branch towards the margin of the leaf; margins often recurved and ciliate. Flowers minute, $\frac{1}{10}$ in. long, solitary and axillary towards the tips of the branches; peduncles short, recurved, clothed with imbricating obtuse bracts. Calyx-lobes obtuse. Corolla-tube not much longer than the calyx; lobes spreading, acute, usually glabrous within. Stamens with very short filaments; anthers half-exserted. Drupe variable in size, $\frac{1}{5}$ – $\frac{1}{3}$ in. diam., globose, succulent, white or red.—*A. Cunn. Precur.* n. 407; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 163; *Handb. N.Z. Fl.* 176; *Benth. Fl. Austral.* iv. 170; *Kirk, Forest Fl.* t. 108. *C. articulata*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 600. *Leucopogon Forsteri*, *A. Rich. Fl. Nouv. Zel.* 216. *Epacris juniperina*, *Forst. Prodr.* n. 71.

Var. *a*.—Leaves rather shorter and broader, with shorter pungent points; lateral veins often branching outwards.

Var. *oxycedrus*.—Leaves usually longer and narrower, with longer pungent points; veins all unbranched.—*C. oxycedrus*, *R. Br. Prodr.* 540.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from the North Cape southwards. Sea-level to 2500 ft. *Mingimingi*. August–November.

2. *C. robusta*, *Hook. f. Handb. N.Z. Fl.* 177.—Habit of *C. acerosa*, but much stouter. Leaves spreading, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad, narrow linear-oblong or linear-lanceolate, obtuse or subacute and callous at the tip, rigid and coriaceous, 5–11-nerved beneath, the nerves often branching on the outer side; margins usually recurved. Flowers $\frac{1}{8}$ in. long, solitary and axillary, more abundantly produced than in *C. acerosa*; peduncles curved, clothed

with numerous broad obtuse imbricating bracts. Corolla-tube hardly longer than the calyx-lobes, its divisions glabrous within. Berry large, globose, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.—*C. acerosa* var. *latifolia*, Hook. f. *Fl. Nov. Zel.* i. 163; *F. Muell. Veg. Chath. Is.* 43.

CHATHAM ISLANDS: Apparently not uncommon, *Dieffenbach*, *H. H. Travers*! *Capt. G. Mair*! *Cockayne* and *Cox*! *Rutitira*.

Distinguished from *C. acerosa*, to which it is closely allied, by the larger broader leaves, which are not at all pungent, but end in obtuse callous tips, and by the larger fruit.

3. *C. empetrifolia*, Hook. f. *Fl. Nov. Zel.* i. 164.—A small depressed or prostrate heath-like shrub, with slender wiry tomentose branches 4–18 in. long, ascending at the tips. Leaves numerous, uniform, erect or ascending when young, spreading or reflexed when old, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, linear, obtuse, convex above, glaucous beneath, glabrous or pubescent or hoary; margins recurved, ciliate. Flowers small, axillary or terminal, solitary or 2–4 clustered at the top of the peduncle. Peduncle short, curved, clothed with imbricating ovate obtuse bracts. Calyx-lobes short, ovate, ciliate. Corolla-tube about as long as the calyx; lobes 5, ovate-lanceolate, acute, glabrous. Drupe small, ovoid, $\frac{1}{10}$ in. long, 3–5-celled.—*Handb. N.Z. Fl.* 177. *Androstoma empetrifolia*, Hook. f. *Fl. Antarct.* i. 44, t. 30.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Abundant in hilly and mountainous districts from Cape Colville and Rotorua southwards. Ascends to 4500 ft.; descends to sea-level in Stewart Island and in the Auckland Islands. November–January.

4. *C. Colensoi*, Hook. f. *Handb. N.Z. Fl.* 177.—Stems stout, decumbent or prostrate below; branches 4–18 in. high, erect or ascending, leafy, pubescent at the tips. Leaves erect or erectopatent, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear-oblong or narrow obovate-oblong, obtuse or shortly mucronate, glabrous, convex above, glaucous beneath, with 3 or 5 stout parallel veins, the outer of which often branch towards the edge of the leaf; margins often dilated and membranous towards the tip of the leaf, finely ciliolate. Flowers in 3–5-flowered short and stout terminal racemes; bracts 2 or 3, broadly ovate, obtuse. Calyx-lobes concave, obtuse, ciliolate. Corolla-tube longer than the calyx; lobes densely bearded within. Drupe globose, $\frac{1}{5}$ in. diam., white or red.—*Leucopogon Colensoi*, Hook. f. *Fl. Nov. Zel.* i. 165.

NORTH ISLAND: Lake Taupo, Tongariro, and Ruapehu, *Colenso*! *Capt. G. Mair*! *H. Hill*! Ruahine Range, *Colenso*! SOUTH ISLAND: Not uncommon on the mountains of Nelson and Canterbury, rare and local in Otago. 2000–5000 ft. December–January.

This was originally placed in *Leucopogon*, and in many of its characters it approaches that genus, although the habit is that of *Cyathodes*.

5. **C. pumila**, Hook. f. *Handb. N.Z. Fl.* 735.—A small depressed densely tufted little plant 2–5 in. high; stems prostrate, with numerous suberect or ascending leafy branches. Leaves imbricate, erect and incurved when dry, shortly petiolate, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, linear-oblong, apiculate, glabrous, flat above, glaucous beneath, with a stout midrib and often a lateral vein on each side as well; margins thickened towards the base of the leaf, broad and thin at the tip. Flowers minute, axillary, solitary; peduncles clothed with numerous imbricating broad concave bracts. Calyx-lobes broadly oblong, obtuse, ciliolate. Corolla-tube cylindrical, much longer than the calyx; lobes 5, acute, densely bearded within. Stamens included. Style short, minutely 5-toothed at the tip. Drupe rather large, $\frac{1}{6}$ – $\frac{1}{5}$ in. diam., globose, 5-celled.

SOUTH ISLAND: Nelson—Mount Arthur, T. F. C. Marlborough—Mount Stokes, J. H. Macmahon! Canterbury—Hurunui Mountains, Travers! Westland—Kelly's Hill, Cockayne! Otago—Summit of Maungatua, B. C. Aston! 2500–5000 ft.

A curious little plant. It is often mistaken for *Pentachondra pumila*, and is probably not uncommon throughout the mountainous districts of the South Island.

3. **LEUCOPOGON**, R. Br.

Erect or prostrate shrubs, or rarely small trees. Leaves scattered or imbricate, sessile or petiolate, striate. Flowers small, white or pink, in axillary or terminal spikes or racemes, sometimes solitary, but the rhachis always ending in the rudiment of an additional flower. Bracts few, usually placed close below the calyx. Calyx 5-partite. Corolla-tube funnel-shaped or campanulate, lobes 5, spreading or recurved, usually densely bearded within. Stamens 5, inserted near the top of the corolla-tube; filaments short, filiform; anthers wholly or partly included in the corolla-tube or in the erect base of the lobes. Ovary 2–3–5-celled; style short or long; stigma small; ovules solitary, pendulous from the top of the cell. Fruit a baccate drupe; mesocarp fleshy; endocarp 2–5-celled; cells 1-seeded.

A large Australian genus of more than 120 species, in addition to which there are a few from the Malay Archipelago and the Pacific islands, and three from New Zealand, two of which are also Australian.

- | | |
|--|-----------------------------|
| A shrub 5–15 ft. Leaves linear-lanceolate. Flowers small, in drooping spikes | 1. <i>L. fasciculatus</i> . |
| A shrub 4–8 ft. Leaves oblanceolate. Flowers small, in crowded erect spikes | 2. <i>L. Richei</i> . |
| Small, 2–8 in. Leaves obovate-oblong, with pungent tips. Flowers large, solitary | 3. <i>L. Fraseri</i> . |

1. **L. fasciculatus**, A. Rich. *Fl. Nouv. Zel.* 215.—A branching shrub or small tree 5–15 ft. high or more; bark black; branches slender, spreading, pubescent at the tips. Leaves very variable in size and shape, flat, spreading, $\frac{1}{2}$ –1 in. long, linear or linear-

lanceolate to obovate-lanceolate or linear-oblong, acute or acuminate or almost pungent, rarely obtuse, sessile, glabrous, 3-7-nerved; margins minutely denticulate or ciliate. Flowers minute, greenish-white, in 6-12-flowered axillary or terminal drooping spikes shorter or longer than the leaves. Bracts and calyx-lobes obtuse, striate, margins ciliate. Corolla-lobes ovate-triangular, acute. Drupe small, $\frac{1}{8}$ - $\frac{1}{6}$ in. long, oblong, red.—*A. Cunn. Precur.* n. 408; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 164; *Handb. N.Z. Fl.* 177. *L. brevibarbis*, *Stch. in Bull. Soc. Nat. Mosc.* xxxii. (1859) i. 14. *Epacris fasciculata*, *Forst. Prodr.* n. 72.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape as far south as Canterbury. Sea-level to 3500 ft. *Mingimingi*. September-November.

Mr. Buchanan has recorded this in his florula of Otago (*Trans. N.Z. Inst.*, vol. i.), but I have seen no specimens from thence, and it is not mentioned in either Petrie's or Kirk's lists.

2. **L. Richei**, *R. Br. Prodr.* 541.—A slender erect much-branched shrub 4-6 ft. high or more; branches glabrous or slightly puberulous, often fascicled. Leaves $\frac{1}{2}$ -1 in. long, linear-lanceolate or oblanceolate, acute or acuminate, narrowed to a sessile base, convex, glaucous beneath, with 3-5 faint nerves; margins recurved. Flowers small, $\frac{1}{8}$ in. diam., white, in subterminal short and dense many-flowered spikes. Bracts striate, barely half the length of the calyx. Calyx-lobes oblong, obtuse. Corolla-tube short, not equalling the calyx; lobes linear-oblong, densely bearded within. Drupe broadly ovoid, 3-5-celled.—*F. Muell. Veg. Chath. Is.* 45; *Hook. f. Handb. N.Z. Fl.* 735; *Benth. Fl. Austral.* iv. 186.

CHATHAM ISLANDS: Not uncommon in sandy soil near the sea, *Travers!* *Capt. G. Mair!* *Miss Seddon!* *Cockayne and Cox!*

This is a common plant in extra-tropical Australia and Tasmania, but so far has been found nowhere in the New Zealand area except in the Chatham Islands.

3. **L. Fraseri**, *A. Cunn. Precur.* n. 409.—A small shrubby plant 2-6 in. high, rarely more, branching from the base; branches decumbent below, erect or ascending above, often curved, leafy, glabrous or minutely puberulous towards the tips. Leaves erect, close-set, imbricating, $\frac{1}{5}$ - $\frac{1}{3}$ in. long, obovate-oblong or linear-oblong, suddenly contracted into a fine rigid pungent point, glabrous and shining above, finely nerved beneath, the nerves branching outwards; margins thin, scarious, cartilaginous, finely ciliate. Flowers axillary and solitary, sessile, large for the size of the plant, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, sweet-scented. Bracts minute, broad, apiculate. Calyx-lobes acute. Corolla-tube cylindrical, more than twice as long as the calyx; lobes short, acute, densely bearded within. Drupe large, $\frac{1}{3}$ in. long or more, broadly oblong, yellowish-orange.—*Hook.*

f. Fl. Nov. Zel. i. 165; *Handb. N.Z. Fl.* 178; *Benth. Fl. Austral.* iv. 218. *L. nesophilus*, *D.C. Prodr.* vii. 752. *L. Bellignianus*, *Raoul, Choix*, 18, t. 12.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in dry heathy places throughout, ascending to 4500 ft. *Totara*. September-January.

Also in Australia and Tasmania. The drupe is juicy, sweetish, and edible.

4. **EPACRIS**, Forst.

Usually erect rigid heath-like shrubs. Leaves sessile or shortly petioled, crowded or imbricated, articulated on the branch, never sheathing. Flowers solitary and axillary, often extending along the branches for a considerable distance, sessile or shortly peduncled, white or red. Bracts numerous, imbricating, clothing the peduncle and concealing the base of the calyx. Calyx 5-partite; corolla-tube cylindric or campanulate; lobes 5, imbricate, spreading. Stamens 5; filaments short, adnate to the corolla-tube; anthers affixed above the middle, wholly or partly included in the corolla-tube. Hypogynous disc of 5 free or rarely connate scales. Ovary 5-celled; ovules numerous, attached to a central placenta. Capsule 5-celled, loculicidally 5-valved. Seeds numerous.

A genus comprising 25 species, all of which are confined to Australia and Tasmania, except the two found in New Zealand, both of which are endemic.

Erect, 2-8 ft. high. Leaves $\frac{1}{2}$ - $\frac{1}{4}$ in., rhomboid-ovate, usually acuminate. Bracts very numerous, acute ..	1. <i>E. pauciflora</i> .
Erect or decumbent, 1-4 ft. Leaves $\frac{1}{2}$ - $\frac{1}{8}$ in., broadly elliptical, obtuse. Bracts few, obtuse	2. <i>E. alpina</i> .

1. ***E. pauciflora***, *A. Rich. Fl. Nouv. Zel.* 213, t. 29.—A slender erect shrub, usually from 3 to 6 ft. high, but occasionally attaining 8-10 ft. or more, sometimes reduced to a few inches; branches often fascicled, erect, leafy, virgate, puberulous at the tips. Leaves suberect, imbricating, $\frac{1}{2}$ - $\frac{1}{4}$ in. long, ovate or rhomboid-ovate or oblong-obovate, suddenly narrowed into a bluntly acuminate point, shortly petiolate, concave, very thick and coriaceous, veinless, glabrous on both surfaces. Flowers small, white, copiously produced towards the tips of the branches. Peduncles shorter than the leaves, entirely concealed by numerous imbricating ovate acute bracts, the uppermost of which closely invest the calyx. Corolla-tube hardly longer than the calyx; lobes spreading, broadly oblong, obtuse. Capsule small.—*A. Cunn. Precur.* n. 411. *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 166; *Handb. N.Z. Fl.* 179.

Var. ***Sinclairii***.—Leaves obtuse, not narrowed into acuminate points.—*E. Sinclairii*, *Hook. f. Handb. N.Z. Fl.* 179.

NORTH AND SOUTH ISLANDS: Open clay hills from the North Cape to Colingwood and Westport, but rare and local south of the Waikato and Thames Rivers. Sea-level to 2000 ft. Flowers most of the year. Var. *Sinclairii*: Great Barrier Island, *Sinclair! Kirk!*

E. Sinclairii differs from *E. pauciflora* in no respect except that the leaves are not narrowed into short acuminate points. But the amount of acumination is so variable in *E. pauciflora*, the points being longer and sharper in young plants, and shorter and broader or almost absent in old ones, that I can entertain no doubt as to the specific identity of the two plants.

2. *E. alpina*, Hook. f. *Fl. Nov. Zel.* i. 166.—A small erect or spreading rarely decumbent much-branched shrub 1–4 ft. high, seldom more; branches twiggy, densely leafy, puberulous at the tips. Leaves suberect or spreading, small, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, broadly elliptical or broadly ovate, obtuse, shortly petiolate, very thick and coriaceous, quite glabrous, concave, veinless. Flowers small, white, numerous towards the tips of the branches. Peduncles short; bracts few, 5–6, broad, obtuse. Calyx-lobes obtuse. Corolla much as in *E. pauciflora*, but smaller.—*Handb. N.Z. Fl.* 179. *E. affinis*, Col. in *Trans. N.Z. Inst.* xx. (1888) 199.

NORTH ISLAND: Vicinity of Lake Taupo, Colenso, T. F. C.; Tongariro and Ruapehu, Kirk! Hill! Rev. F. H. Spencer! Ruahine Range, H. Tryon! Kaweka Range, Petrie! SOUTH ISLAND: Nelson—Ngakawau, Rev. F. H. Spencer; Mount Owen and Buller Valley, W. Townson! T. F. C. Westland—Denniston, J. Caffin! Southern Alps, Sinclair and Haast (Handbook). 1000–4000 ft. December–January.

Closely allied to *E. pauciflora*, but distinguished by the smaller size and more spreading habit, smaller obtuse leaves, and fewer obtuse bracts.

Three Australian species of *Epacris* (*E. purpurascens*, R. Br., *E. pulchella*, Cav., and *E. microphylla*, R. Br.) have become plentifully naturalised in open “tea-tree country” in several localities near the Manukau Harbour in the vicinity of Papakura and Drury (Auckland District). The first-mentioned was originally discovered by the late Dr. Sinclair and General Bolton nearly fifty years ago, and was included by Sir J. D. Hooker in both the “*Flora Novæ-Zelandiæ*” and the Handbook, although he expressed the opinion that it was probably introduced. The two others were first noticed by Mr. A. T. Urquhart (see *Trans. N.Z. Inst.* xiv. 364, and xxviii. 20). All three species belong to the division of the genus which has the corolla-tube shorter or barely longer than the calyx, and all three have broad acuminate leaves, cordate at the base. *E. purpurascens* can be distinguished by the large leaves with long pungent points and rather large pale-pink flowers, which are usually most abundantly produced.

5. *ARCHERIA*, Hook. f.

Much-branched erect or spreading shrubs. Leaves flat. Flowers white or pink, in few-flowered terminal racemes. Bracts caducous. Calyx of 5 almost free sepals. Corolla-tube rather broad, ventricose-cylindrical or almost campanulate; lobes 5, short, spreading or recurved, imbricate in the bud. Stamens 5, affixed to the throat of the corolla; filaments very short; anthers broad, attached about the middle. Hypogynous disc short, cupular or of 5 free scales. Ovary 5-celled and deeply 5-lobed; style columnar, inserted in a broad depression at the top of the ovary; stigma dilated, more or less distinctly 5-lobed; ovules numerous in each cell. Capsule 5-celled, loculicidally 5-valved. Seeds numerous.

A small genus of 5 species, confined to New Zealand and Tasmania. It differs from *Epacris* mainly in habit, in the deciduous bracts, and in the position of the style.

Leaves 1-1½ in., obovate-oblong	..	..	..	1. <i>A. racemosa</i> .
Leaves ½-¾ in., lanceolate	..	..	..	2. <i>A. Traversii</i> .

1. *A. racemosa*, Hook. f. *Handb. N.Z. Fl.* 180.—An erect much-branched shrub 6-15 ft. high; bark black; branches spreading. Leaves scattered at intervals so as to appear almost whorled, spreading, 1-1½ in. long, ⅓-½ in. broad, obovate-oblong or elliptic-oblong, acute, sometimes almost pungent, narrowed into a very short petiole or almost sessile, flat, rigid and coriaceous; veins reticulated. Racemes terminating the branches, solitary or 2-3 together, 1-2 in. long, 10-25-flowered; rhachis pubescent; pedicels short, stout, curved. Bracts coloured, caducous; a large leaf-like one at the base of each pedicel, and 2 smaller and narrower ones just below the flower. Sepals oblong-lanceolate; margins membranous, ciliolate. Corolla ⅙ in. long, pink; tube short and broad; lobes short, spreading, ovate-triangular, obtuse. Style short, stout. Capsule small, globose, ⅙ in. diam.—*Epacris racemosa*, Hook. f. *Fl. Nov. Zel.* i. 167.

NORTH ISLAND: Great Barrier Island, *Sinclair, Kirk!* Little Barrier Island, *Shakespear!* T. F. C.; Thames goldfields, *Kirk, Adams!* T. F. C.; East Cape district, *Bishop Williams!* 500-2800 ft. January-February.

The large concave bracts entirely hide the young racemes, but fall off as soon as the flowers commence to expand.

2. *A. Traversii*, Hook. f. *Handb. N.Z. Fl.* 180.—A large much-branched shrub 6-15 ft. high; bark dark-brown; branches spreading. Leaves scattered, spreading, ⅓-½ in. long, lanceolate or linear-lanceolate, acute, thick and coriaceous, quite glabrous, smooth and shining above, midrib distinct beneath; margins recurved, often ciliolate. Racemes terminal, ½-1 in. long, 8-15-flowered; rhachis and pedicels pubescent. Bracts oblong, membranous, caducous, falling away as soon as the flowers commence to open. Sepals oblong, obtuse, striate; margins membranous, ciliolate. Corolla ⅓-½ in. long, campanulate, reddish; lobes short, spreading. Style very short, stout. Capsule minute, depressed, ⅓ in. diam.

Var. *australis*, Hook. f. l.c. 735.—Stouter. Leaves longer and broader, ½-¾ in., elliptical-lanceolate or oblong, obtuse or subacute. Flowers rather longer.

SOUTH ISLAND: Nelson—Aorere Valley, *Travers*; Mount Arthur Plateau, T. F. C.; Brunner Range, *Townson!* Canterbury and Westland—Bealey Gorge and Arthur's Pass, *Kirk!* *Cockayne!* T. F. C.; Browning's Pass, *Haus!* Rangitaipo, *Petrie!* Otago—Lake Wanaka, *Buchanan!* Clinton Valley, *Reece* and Hollyford Valleys, *Petrie!* Var. *australis*: Common in the sounds of the south-west of Otago, *Hector* and *Buchanan!* STEWART ISLAND: Mount Anglem, *Kirk!* Sea-level to 4000 ft. January-February.

6. DRACOPHYLLUM, Labill.

Erect or prostrate shrubs, or more rarely small trees; branches ringed with the scars of the fallen leaves. Leaves crowded at the ends of the branches or imbricate along them, broad and sheathing at the base, above that suddenly contracted into a very narrow linear rigid or grassy usually concave blade. Flowers small, white or red, in terminal or lateral panicles or racemes or spikes, rarely solitary. Sepals 5, ovate or lanceolate, persistent. Corolla cylindric or campanulate; lobes 5, spreading, imbricate, often incurved at the tips. Stamens hypogynous, or the filaments adnate to the corolla-tube; anthers usually included in the tube, attached at or near the middle. Hypogynous scales 5, free. Ovary 5-celled; style inserted in a depression at the top of the ovary; stigma small, or larger and 5-lobed; ovules numerous, attached to a decurved placenta in the inner angle of the cell. Capsule 5-celled, loculicidally 5-valved. Seeds numerous.

In addition to the 18 species found in New Zealand, all of which are endemic, there are 10 in Australia and Tasmania, and 5 in New Caledonia. The student will find the species exceedingly difficult of discrimination, especially those of section B, where they appear to pass into one another by small gradations, and where the chief distinctive characters available are the highly variable ones of size, habit, and foliage.

A. Flowers paniced. Calyx small, much shorter than the corolla-tube, and always much less than the ripe capsule.

- Shrub or small tree 8-20 ft. high. Leaves 10-18 in., 1-1½ in. wide at the base. Panicle terminal, 6-18 in. long. Flowers ½ in. diam. Capsules 1/10 in. 1. *D. latifolium*.
 Similar to the preceding but much stouter. Leaves 10-24 in., 1-2 in. wide. Panicles denser. Capsules larger, ½ in. diam. 2. *D. Traversii*.
 Shrub 10-20 ft. high. Leaves 6-12 in., ½-¾ in. wide at the base. Panicles small, lateral below the leaves, drooping, 2-3 in. long. Flowers ½ in. long 3. *D. Townsoni*.
 Small much-branched shrub, stem often decumbent below. Leaves 3-8 in. long. Panicles lateral, drooping, 3-6 in. long. Flowers large, ½ in. long 4. *D. Menziesii*.
 Small much-branched shrub. Leaves 1½-4 in. long. Panicles terminal, 1½-4 in. long. Flowers ½-¾ in. 5. *D. strictum*.

B. Flowers in spike-like racemes or solitary. Calyx almost equalling the corolla-tube or longer than it, always completely enclosing the ripe capsule.

* Flowers in spike-like racemes.

- Shrub 4-15 ft. Leaves patent and recurved, 1½-5 in. long. Racemes lateral, 4-8-flowered. 6. *D. Sinclairii*.
 Shrub 1-3 ft. Leaves patent and recurved, ½-1½ in. long, obtuse. Flowers in terminal bracteate spikes 7. *D. recurvum*.
 Leaves erect, 3-10 in. long, sheathing base ½-¾ in. broad. Racemes 6-15-flowered 8. *D. longifolium*.
 Leaves erect, 1-5 in. long, sheathing base ¾-1 in. wide, truncate or auricled at the tip. Racemes 4-12-flowered 9. *D. Urvilleanum*.
 Leaves in many series, erect and appressed, very stout, polished, glabrous, ¾-1 in. long. Racemes 3-6-flowered 10. *D. Pearsoni*.

- Leaves erect, $\frac{3}{4}$ -3 in. long, silky-pubescent above, margins ciliate with copious white hairs. Racemes 3-6-flowered 11. *D. scoparium*.
 Very slender. Leaves small, erect, $\frac{1}{3}$ -1 in. long. Racemes 2-5-flowered 12. *D. subulatum*.
 Stout, spreading, much branched. Leaves spreading, 1-2 $\frac{1}{2}$ in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad at the base, gradually tapering, evenly pubescent on both surfaces. Racemes 3-5-flowered 13. *D. pubescens*.

** Flowers usually solitary.

- Decumbent. Leaves spreading, $\frac{3}{4}$ -2 in. long, $\frac{1}{6}$ in. broad at the base, gradually tapering, glaucous, glabrous. Flowers lateral, solitary 14. *D. Kirkii*.
 Erect. Leaves $\frac{1}{2}$ -2 in. long (2-4 in. in var. *acicularifolium*); blade $\frac{1}{20}$ - $\frac{1}{15}$ in. broad, pungent. Flowers lateral 15. *D. uniflorum*.
 Depressed or prostrate, rarely suberect. Leaves $\frac{1}{4}$ -1 in., obtuse. Flowers usually terminating short lateral branchlets 16. *D. rosmarinifolium*.
 Small, prostrate, laxly or closely branched. Leaves imbricate, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, linear-subulate from a broad ovate base. Flower terminal 17. *D. prostratum*.
 Small, forming densely compacted tufts a few inches across. Leaves closely imbricate, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, imbricate, usually obtuse 18. *D. muscoides*.

1. *D. latifolium*, A. Cunn. *Precur.* n. 412.—A shrub or small tree 8-20 ft. high or more, with a trunk 4-12 in. diam.; young plants forming slender erect unbranched rods with a tuft of grassy leaves at the top; old ones much branched, the branches often whorled, curving outwards and then ascending, giving the tree a candelabrum-like appearance, closely ringed with the scars of the fallen leaves. Leaves crowded at the tips of the branches, squarrose, spreading and recurved, 10-24 in. long, 1-1 $\frac{1}{2}$ in. broad at the dilated sheathing base, gradually tapering into very long slender points, quite glabrous, coriaceous, striate, concave or rarely nearly flat, margins very minutely serrulate. Panicle terminal, 6-18 in. long, much and closely branched, linear-oblong, erect in flower, inclined in fruit, rhachis and pedicels densely pubescent. Flowers crowded, very numerous, shortly pedicelled, $\frac{1}{8}$ in. diam., reddish. Calyx very small, not $\frac{1}{4}$ the length of the corolla; sepals broadly ovate, acute or obtuse, striate. Corolla campanulate, lobes rather longer than the tube, oblong, obtuse, sharply recurved. Anthers large, oblong, exserted. Capsule small, $\frac{1}{10}$ in. diam., depressoglobose—*Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 167; *Handb. N.Z. Fl.* 181; *Kirk, Forest Fl.* t. 123. *D. recurvatum*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 92.

NORTH ISLAND: Common in hilly forests from the North Cape to Hawke's Bay and Taranaki. SOUTH ISLAND: Nelson and Westland, from Collingwood as far south as Charleston. Sea-level to 3000 ft. *Neinei*. January-February.

2. **D. Traversii**, *Hook. f. Handb. N.Z. Fl.* 736.—Very closely allied to *D. latifolium*, but a larger and much more robust plant, sometimes 30 ft. high, with a trunk 2 ft. in diam. Leaves 1–2 ft. long, 1–2 in. broad at the base, gradually tapering into long almost filiform points, rigid and coriaceous, slightly concave, striated, margins smooth and entire or very obscurely serrulate. Panicle terminal, strict, linear-oblong, much and very closely and densely branched; rhachis and pedicels stout, pubescent. Flowers much as in *D. latifolium*, but rather larger. Capsule larger and on stouter pedicels, $\frac{1}{3}$ in. diam.

SOUTH ISLAND: Nelson and Westland—Not uncommon in subalpine localities from Collingwood and the Mount Arthur Plateau to the Haast River and Jackson's Bay. 2500–4500 ft. January–February.

By far the finest species of the genus. Although very different in appearance from *D. latifolium* it is difficult to point out any character of importance to separate it from that plant apart from the increased size and stoutness, the more rigid leaves, denser panicles, and rather larger capsules. A state of *D. latifolium*, not uncommon on high peaks in the Auckland District, approaches it in foliage and in inflorescence, but not in habit.

3. **D. Townsoni**, *Cheesem. n. sp.*—A large branching shrub 12–20 ft. high; branches stout, ringed with the scars of the fallen leaves. Leaves crowded at the ends of the branches, very similar to those of *D. latifolium* but smaller, 6–12 in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad at the dilated sheathing base, very gradually narrowed into fine slender points, rigid and coriaceous, concave, striate, margins minutely serrulate. Panicles small, lateral below the leaves, much curved and drooping, 2–3 in. long, rather closely branched. Flowers crowded, very shortly pedicelled or almost sessile on the branches of the panicle, about $\frac{1}{8}$ in. long. Calyx small, but almost as long as the tube of the corolla; sepals broadly ovate, obtuse, striate. Corolla campanulate, lobed nearly half-way down; lobes oblong, obtuse, sharply reflexed. Anthers exserted. Capsule small, $\frac{1}{8}$ in. diam., depresso-globose.

SOUTH ISLAND: Nelson—Vicinity of Westport, *Townson!*

This has the peculiar lateral drooping panicle of *D. Menziesii*, but is a much larger plant, with longer and proportionately narrower more grassy leaves. The corolla is markedly different, being not half the size, and deeply lobed nearly half-way down, with the lobes sharply reflexed. In *D. Menziesii*, in addition to the much larger corolla, the lobes are very small, not one-quarter the length of the tube.

4. **D. Menziesii**, *Hook. f. Fl. Nov. Zel.* i. 168.—A small much-branched shrub, often reduced to a foot or two in height; branches very robust, naked, ringed with the scars of the fallen leaves. Leaves crowded near the ends of the branches, like those of *D. latifolium* but much smaller, spreading and recurved, 3–8 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad at the base, gradually tapering to a fine point, slightly concave, rigid and coriaceous, striate; margins cartil-

aginous, closely and minutely serrulate. Panicles lateral from below the leaves, 3-5 in. long, sparingly branched and often reduced to a simple raceme, drooping; rhachis and pedicels pubescent. Flowers large, waxy-white, $\frac{1}{3}$ in. long, on short curved pedicels. Calyx small, not $\frac{1}{4}$ as long as the corolla; sepals broadly ovate, subacute, striate. Corolla large, campanulate, tube three or four times as long as the calyx; lobes very short, recurved. Anthers included. Capsule depresso-globose, $\frac{1}{6}$ - $\frac{1}{5}$ in. diam.—*Handb. N.Z. Fl.* 181.

SOUTH ISLAND: Canterbury—Ashburton Mountains, *Potts!* (flowers not seen). Otago—Lake district, *Buchanan!* mountains above Lake Harris, *Kirk!* mountains to the west of Lakes Wakatipu and Te Anau, *Petrie!* Humboldt Mountains, *Cockayne!* Dusky Bay, *Menzies, Reischek!* Port Preservation, *Lyall.* STEWART ISLAND: Mount Anglem, *Kirk!* Ascends to 4500 ft., descends almost to sea-level in Dusky Sound. December–February.

An exceedingly distinct species, with the largest flowers of the genus. Alpine specimens are sometimes only 1-2 ft. high, with few very stout naked branches bearing a globose head of squarrose leaves.

5. *D. strictum*, *Hook. f. Fl. Antarct.* i. 48.—A much-branched shrub; branches bare below, ringed with the scars of the fallen leaves. Leaves erect or spreading, variable in size, $1\frac{1}{2}$ -4 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. wide at the sheathing base, which is not conspicuously broader than the blade, gradually tapering into a rigidly acuminate or pungent point, flat or slightly concave, somewhat glaucous, coriaceous, margins minutely serrulate. Panicles terminal, $1\frac{1}{2}$ -4 in. long, narrow, erect or curved or cernuous; rhachis and pedicels glabrous or puberulous. Bracts caducous. Flowers rather numerous, $\frac{1}{3}$ - $\frac{1}{4}$ in. long, shortly pedicelled, white. Calyx small, about $\frac{1}{3}$ the length of the corolla; sepals broadly ovate, acute, finely ciliolate. Corolla narrow-campanulate; lobes short, broadly triangular, with inflexed margins. Anthers included; filaments rather long. Capsule depresso-globose, small, $\frac{1}{10}$ in. diam.—*Fl. Nov. Zel.* i. 168; *Handb. N.Z. Fl.* 181. *D. affine*, *Hook. f. Fl. Antarct.* i. 48; *Fl. Nov. Zel.* i. 168. *D. imbricatum*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 331.

NORTH AND SOUTH ISLANDS: From the Thames River to the south of Otago, not common. In the South Island mainly found on the western side of the island. Sea-level to 3000 ft. *Totorowhiti.* November–March.

Very variable in the size of the leaves. On young plants or on vigorous shoots they are frequently 4-5 in. long and proportionately broad; but on old plants or in exposed situations they are often reduced to $1\frac{1}{2}$ in. or less.

6. *D. Sinclairii*, *Cheesem.* — A tall erect branching shrub, usually 4-8 ft. high, rarely taller and forming a small tree 12-20 ft. in height; bark brownish-black. Leaves spreading and recurved, suberect when young, often clothing the branches for a considerable length, $1\frac{1}{2}$ -5 in. long, $\frac{1}{6}$ - $\frac{1}{3}$ in. wide at the sheathing base, which is not truncate nor auricled and not very much wider

than the blade, gradually narrowed into long acuminate points, coriaceous or somewhat grassy, concave; margins finely serrulate, ciliate at the base. Racemes lateral, 1-2 in. long, 4-8-flowered, usually fascicled along the branches some distance below the tip. Bracts persistent, ovate-lanceolate, acuminate. Flowers $\frac{1}{4}$ in. long, white. Sepals almost equalling the corolla, ovate-lanceolate, acuminate. Anthers included. Style short, stout. Capsule small, concealed by the persistent sepals.—*D. squarrosus*, *Hook. f. Fl. Antarct.* i. 48. (not of *R. Br.*); *Fl. Nov. Zel.* i. 169; *Handb. N.Z. Fl.* 181.

NORTH ISLAND: From the North Cape as far as the East Cape, but often local, usually near the sea. Ascends to 2500 ft. Flowers most of the year.

Hooker's name is most appropriate; but unfortunately it is preoccupied by an Australian species (*D. squarrosus*, *R. Br. Prodr.* 556). This was made the type of the genus *Sphenotoma* by Don, but was reunited with *Dracophyllum* by Benthham in the "Flora Australiensis."

7. *D. recurvum*, *Hook. f. Fl. Antarct.* i. 50.—A small rather stout much-branched shrub 6 in. to 2 ft or 3 ft. high; bark blackish-brown; branches naked, ringed with the scars of the fallen leaves. Leaves crowded at the tips of the branches, spreading and recurved, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long; sheathing base membranous, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad, ciliate, suddenly narrowed into a rigid and coriaceous linear-subulate usually much recurved lamina, which is concave on the upper surface and almost keeled beneath, tip obtuse, margins minutely serrulate. Flowers $\frac{1}{4}$ in. long, in short and stout terminal bracteate spikes $\frac{1}{2}$ -1 in. long; bracts numerous, large, persistent, almost concealing the flowers, base broad and foliaceous, tip short, subulate. Sepals ovate-lanceolate, acute, almost as long as the corolla-tube, ciliate. Corolla narrow-campanulate; lobes short, ovate-triangular, acute. Anthers included. Style very short. Capsule small, $\frac{1}{8}$ in. long, shorter than the sepals.—*Fl. Nov. Zel.* i. 171; *Handb. N.Z. Fl.* 181. *D. rubrum*, *Col. in Trans. N.Z. Inst.* xx. (1888) 200. *D. tenuicaulis*, *Col. l.c.* xxii. (1890) 476. *D. brachyphyllum* and *D. varium*, *Col. l.c.* xxviii. (1896) 602, 604. *D. brachycladum*, *Col. l.c.* xxxi. (1899) 275.

NORTH ISLAND: Mount Hikurangi, East Cape district, *Colenso*! *Tongariro* and *Ruapehu*, *Bidwill*, *Captain G. Mair*, *Kirk*, and others; *Ruahine Range*, *Colenso*! *H. Hill*! *Petrie*! 2500-4500 ft.

Easily distinguished by the small size, recurved leaves, and short dense terminal spikes with foliaceous bracts. I have examined the type specimens of Mr. Colenso's new species preserved in his herbarium, but fail to see how they can be separated even as varieties.

8. *D. longifolium*, *R. Br. Prodr.* 556.—Very variable in stature, sometimes a shrub from 4 to 8 ft. high, at others forming a small tree 12 to 25 ft. with a trunk 6-15 in. diam.; bark black; branches slender, erect, naked below. Leaves

crowded at the tips of the branches, erect, or spreading when young, strict, 3–10 in. long, narrow linear-subulate; sheathing base $\frac{1}{3}$ – $\frac{2}{3}$ in. long and as wide, brown, striate, margins scarious, ciliate; blade $\frac{1}{8}$ – $\frac{1}{6}$ in. broad at the base, gradually tapering into a long acuminate pungent tip, concave, rigid and coriaceous, striate, often pubescent above, margins entire or minutely serrulate. Racemes terminal on short lateral branchlets or rarely ending the main branches, strict, erect or inclined, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, 6–15-flowered. Bracts numerous, a large foliaceous one at the base of each pedicel and 2–4 equalling the calyx at the base of each flower. Flowers white, $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Sepals ovate-lanceolate, acute, ciliate, almost equalling the corolla-tube. Corolla campanulate; lobes ovate-triangular, inflexed at the tip. Anthers included. Capsule $\frac{1}{6}$ in. diam., enclosed within the persistent sepals.—*A. Rich. Fl. Nouv. Zel.* 219; *A. Cunn. Precur.* n. 413; *Raoul, Choix*, 44; *Hook. f. Fl. Antarct.* i. 45, t. 31, 32; *Fl. Nov. Zel.* i. 169; *Handb. N.Z. Fl.* 182; *Kirk, Forest Fl.* v. 109. *D. Lyallii*, *Hook. f. Fl. Nov. Zel.* i. 169. *Epacris longifolia*, *Forst. Prodr.* n. 68.

NORTH ISLAND: East Cape district, *Bishop Williams*! *Adams* and *Petrie*! Ruahine Mountains, *A. Hamilton*! Tararua Mountains, *J. Buchanan*! SOUTH ISLAND: Not uncommon in mountain districts throughout. STEWART ISLAND: Abundant, *Petrie*! *G. M. Thomson*! *Kirk*! AUCKLAND AND CAMPBELL ISLANDS: Forming a considerable proportion of the ligneous vegetation, *Hooker*, *Kirk*! *F. R. Chapman*! Sea-level to 4000 ft. *Inanga*; *Grass-tree*. November–March.

A very variable plant. In its extreme state, which is best seen in the sounds of the south-west coast of Otago, in Stewart Island, and in the Auckland Islands, it forms a tree sometimes 30 ft. in height, with leaves often a foot in length; but in open mountain districts in the South Island it is rarely more than a few feet high, with much shorter and narrower leaves. This form is difficult to separate from some varieties of *D. Urvilleanum*; in fact, there does not appear to be any strict line of demarcation between the two species.

9. ***D. Urvilleanum***, *A. Rich. Fl. Nouv. Zel.* 221. — A much or sparingly branched shrub 4–8 ft. high; branches slender, erect; bark black or dark chestnut-brown. Leaves very variable, slender, often flexuous, erect, 1–5 in. long; sheathing base $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, brown, striate, membranous, truncate or auricled at the tip, margins scarious, ciliate; blade very narrow, $\frac{1}{20}$ – $\frac{1}{10}$ in. broad at the base, coriaceous, concave or canaliculate above, triquetrous or nearly so at the tip, margins minutely denticulate. Racemes on short lateral branchlets, rarely ending the main branches, strict, erect, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, 4–12-flowered. Flowers small, white or red, $\frac{1}{5}$ – $\frac{1}{4}$ in. long. Sepals ovate-lanceolate, acuminate, as long as or longer than the corolla-tube. Corolla-lobes rather narrow. Anthers included. Capsule $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., enclosed within the persistent sepals.—*Hook. f. Handb. N.Z. Fl.* 182.

Var. **a.**—Branches long, slender; bark black. Leaves rather short, 1– $2\frac{1}{2}$ in. long, concave above. Racemes 3–6-flowered, lateral, often crowded along the

branches for some distance below the tips. Flowers rather small, narrow.—*D. Urvilleanum*, *A. Rich.*; *A. Cunn. Precur.* n. 415; *Racoul, Choix*, 44; *Hook. f. Fl. Antarct.* i. 49; *Fl. Nov. Zel.* i. 169.

Var. *filifolium*.—Branches long, slender; bark black or chestnut-brown. Leaves long, $2\frac{1}{2}$ –5 in., very narrow, often flexuose, canaliculate above.—*D. filifolium*, *Hook. f. Fl. Nov. Zel.* i. 169. *D. setifolium*, *Stecheg.* in *Bull. Soc. Nat. Mosc.* xxxii. (1859) i. 23. *D. virgatum* and *D. heterophyllum*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 605. (?) *D. pungens*, *Col. l.c.* 602.

Var. *Lessonianum*.—Branches stouter. Leaves $1\frac{1}{2}$ –3 in. long, strict, flat above, convex beneath. Racemes 6–12-flowered; flowers usually larger.—*D. Lessonianum*, *A. Rich. Fl. Nouv. Zel.* 223; *A. Cunn. Precur.* n. 416; *Hook. f. Fl. Nov. Zel.* i. 170. Some forms of this approach *D. longifolium* very closely.

Var. *montanum*.—Smaller and stouter, often densely branched. Leaves $\frac{3}{4}$ –2 in. long, erect or spreading, broad at the base and gradually narrowed into the sheath, which is not auricled above. Flowers in stout terminal or lateral spike-like racemes $\frac{1}{2}$ –1 in. long; bracts broad, concave. This is allied to *D. scoparium*, and was included in it by Hooker, but the leaves are quite glabrous.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Var. *a.* abundant on dry hills from the North Cape to Nelson; var. *filifolium*, from the Bay of Islands to Wellington, ascending to 4500 ft. on Mount Egmont and the Ruahine Mountains, &c.; var. *Lessonianum*, from Rotorua southwards to Stewart Island, usually in mountain districts; var. *montanum*, Mount Hikurangi, Tongariro and Ruapehu, Ruahine Mountains, Tararua Mountains, and apparently not uncommon in the mountains of the South Island, from 2500 ft. to 4500 ft.

At first sight the extreme forms of this look very distinct, but they are connected by so many transitional stages that I think Sir J. D. Hooker was right in referring them to a single species.

10. *D. Pearsoni*, *T. Kirk in Trans. N.Z. Inst.* xvii. (1885) 223.—Apparently a stout erect much-branched shrub; branches with the leaves on nearly $\frac{1}{2}$ in. diam. Leaves numerous, close-set, densely imbricating, erect and appressed to the branch, $\frac{3}{4}$ –1 in. long; sheathing base $\frac{1}{6}$ in. wide, not auricled nor truncate at the tip, margins ciliate; blade $\frac{1}{2}$ – $\frac{1}{6}$ in. wide at the base, linear-subulate, pungent, rounded on the back, flat or convex in front, smooth and polished, glabrous, margins minutely denticulate. Flowers small, $\frac{1}{5}$ in. long, in dense 3–6-flowered spike-like racemes $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Sepals ovate, acuminate, rather shorter than the corolla-tube, margins ciliate. Corolla-lobes ovate-triangular, acute. Capsule obovoid, included within the persistent calyx-lobes.

STEWART ISLAND: Mount Anglem and Smith's Lookout, *Kirk!* locality doubtful, *Pearson!*

This appears to differ from *D. Urvilleanum* in the more numerous densely imbricating closely appressed leaves, but further specimens may prove it to be a form of that plant.

11. *D. scoparium*, *Hook. f. Fl. Antarct.* i. 46.—A shrub or small tree, sometimes 20 ft. high or more; bark dark chestnut-brown; branches dense, erect. Leaves crowded at the tips of the branches, strict, erect, $\frac{3}{4}$ –3 in. long; sheathing base $\frac{1}{8}$ – $\frac{1}{6}$ in. broad,

not auricled nor truncate, margins scarious, ciliate with copious white hairs; blade $\frac{1}{2}$ – $1\frac{1}{2}$ in. wide at the base, gradually tapering upwards, rigid and coriaceous, upper surface more or less silky-pubescent, concave or nearly flat, lower glabrous, convex or almost keeled towards the tip, margins ciliate with white hairs for their whole length. Flowers white, about $\frac{1}{4}$ in. long, in dense 3–6-flowered spike-like racemes $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Bracts broadly ovate, acuminate, silky within, margins ciliate. Sepals ovate, acuminate, ciliate, about equalling the corolla-tube. Corolla-lobes short, triangular, acute. Capsule broadly obovate, included within the persistent calyx-lobes.—*Fl. Nov. Zel.* i. 170. *D. Urvilleanum* var. *scoparium*, *Handb. N.Z. Fl.* 182 (*in part*).

Var. major.—Taller and stouter, often 20–30 ft. high when fully adult. Leaves of mature plants $1\frac{1}{2}$ –3 in., margins more copiously ciliate; of young plants or of the lower branches of old ones 6–9 in. long or more, $\frac{1}{3}$ – $\frac{3}{4}$ in. wide, flat, ciliate, gradually tapering into long acuminate points. Racemes 4–8-flowered; flowers rather larger. Bracts and calyx-lobes often silky on the back. *D. latifolium* var. *ciliolatum*, *Hook. f. Handb. N.Z. Fl.* 736 (young plant). *D. arboreum*, *Cockayne in Trans. N.Z. Inst.* xxxiv. (1902) 318.

Var. paludosum.—Smaller, 3–6 ft. high when adult, and often flowering when less than 6 in. Leaves 1 – $1\frac{1}{2}$ in., not longer and wider in the young state. Racemes short, 2–4-flowered; flowers rather smaller.—*D. rosmarinifolium*, *Buch. in Trans. N.Z. Inst.* vii. (1875) 338 (*not of Forst.*). *D. paludosum*, *Cockayne in Trans. N.Z. Inst.* xxxiv. (1902) 318.

CAMPBELL ISLAND: Near the sea, not common, *Hooker, Kirk!* CHATHAM ISLANDS: *Var. major* and *paludosum* not uncommon, the latter chiefly in swamps, *Dieffenbach, H. H. Travers!* *Enys!* *Cox* and *Cockayne!*

Closely allied to *D. Urvilleanum*, to which it was reduced by Sir J. D. Hooker in the Handbook, but constantly differing in the conspicuously ciliate margins of the leaves, which are also silky-pubescent on the upper surface. The leaf-sheaths are also never auricled or truncate, as in *D. Urvilleanum*, but are simply rounded at the top, passing more gradually into the blade. My two varieties *major* and *paludosum* are both treated as distinct species by Mr. Cockayne. It is possible that he may be correct with respect to *var. major*, which differs not only in its much larger size, but also in the very distinct leaves of the juvenile stage. But the leaves and flowers of the mature stage are in both varieties so very similar to those of the original Campbell Island plant that I hesitate to separate either of them.

12. *D. subulatum*, *Hook. f. Fl. Antarct.* i. 50.—An erect shrub 2–6 ft. high, with long slender twiggy branches leafy at the tips: bark dark red-brown or almost black. Leaves small, strict or flexuose, $\frac{1}{3}$ –1 in. long, rarely more; sheathing base $\frac{1}{2}$ – $\frac{1}{10}$ in. broad, truncate or auricled at the tip; blade very narrow, $\frac{1}{30}$ – $\frac{1}{40}$ in. wide at the base, pungent, rigid and coriaceous, concave or flat above, convex beneath, triquetrous at the tip, glabrous on the margins, most minutely serrulate. Leaves of young plants larger, sometimes $\frac{3}{4}$ – $1\frac{1}{2}$ in. long by $\frac{1}{12}$ in. wide at the base, spreading or recurved. Racemes small, lateral, often crowded along the branches, 2–6-flowered. Flowers small, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Bracts with broadly

ovate sheathing bases and erect subulate tips. Sepals usually exceeding the corolla-tube.—*Fl. Nov. Zel.* i. 171; *Handb. N.Z. Fl.* 182.

NORTH ISLAND: From Rotorua and the Upper Thames Valley to Taupo, Ruapehu, and the Ruahine Mountains. 350 to 3500 ft. *Monoao*. November–March.

Easily recognised by its small size and erect slender habit, short very narrow leaves, and small flowers.

13. *D. pubescens*, *Cheesem. n. sp.*—A small densely branched woody shrub; branches stout, often decumbent below, erect or ascending above; bark dark reddish-brown or almost black. Leaves crowded, spreading or erecto-patent, 1–2½ in. long, ⅙–⅓ in. broad at the sheathing base, which is not much broader than the blade, gradually narrowed to an acuminate and pungent point, coriaceous, concave in front, rounded on the back, glaucous, striate, minutely and evenly pubescent on both surfaces, sometimes becoming almost glabrous when old. Flowers about ¼ in. long, in 3–5-flowered spikes terminating short lateral branchlets. Bracts ovate, acuminate; margins ciliate. Sepals ovate or ovate-lanceolate, acuminate, equalling the corolla-tube. Corolla-lobes triangular, acute. Capsule obovoid, included within the persistent calyx-lobes.

SOUTH ISLAND: Nelson—Mountains near Westport, *Townson!* 1500–2500 ft.

Habit of *D. Kirkii*, *Berggren*, but a larger and stouter and more copiously branched plant, with the leaves finely and equally pubescent on both surfaces, and with the flowers in 3–5-flowered spikes, not solitary. The leaves are very similar in shape to those of small specimens of *D. strictum*, and are quite different to those of *D. Urvilleanum*, *D. scoparium*, and their allies.

14. *D. Kirkii*, *Berggren in Journ. Bot.* xviii. (1880) 104. — A small depressed woody shrub; branches very stout, 6–18 in. long, prostrate or decumbent, suberect at the tips; bark reddish-brown. Leaves crowded, spreading or suberect, ¾–2 in. long, ⅙ in. wide at the sheathing base, which is not conspicuously broader than the blade, gradually narrowed into an acuminate pungent point, coriaceous, more or less concave, glaucous, quite glabrous, striate; margins very minutely serrulate. Flowers solitary, lateral, ¼–⅓ in. long, shortly pedicelled. Bracts 2–3, sheathing, the tips often exceeding the flower. Sepals ovate, acuminate, shorter than the corolla-tube, margins minutely ciliate. Corolla-lobes ovate-triangular, acute. Anthers included. Capsule broadly obovoid, ⅓ in. diam., enclosed in the persistent calyx-lobes.—*D. uniflorum*, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 15, t. 4, f. 1–11 (*not of Hook. f.*).

SOUTH ISLAND: Nelson—Lake Tennyson, *T. F. C.* Canterbury—Mount Torlesse, *Berggren*; Arthur's Pass, *Kirk! Cockayne! T. F. C.*; Waimakariri Glacier, *T. F. C.*; Ashburton Mountains, *Potts!* Mount Cook district, *T. F. C.* Westland—Kelly's Hill, *Petrie!* 2500–4500 ft. December–February.

A very distinct species. The leaves are quite unlike those of any other species belonging to the same section of the genus, having the sheathing bases not much wider than the blade; but they much resemble those of *D. strictum*, in the section with paniced inflorescence. Its only near ally is *D. pubescens*, which differs in the pubescent leaves and 3-5-flowered spikes.

15. *D. uniflorum*, Hook. f. *Handb. N.Z. Fl.* 182.—A stout erect shrub 3-6 ft. high; bark dark-brown or almost black. Leaves crowded at the tips of the branches, erect, strict or flexuous, $\frac{1}{2}$ -2 in. long; sheathing base $\frac{1}{10}$ - $\frac{1}{6}$ in. broad, rounded at the tip but not auricled, margins ciliate; blade $\frac{1}{20}$ - $\frac{1}{15}$ in. broad at the base, rigid, coriaceous, pungent, semiterete below, triquetrous above, margin most minutely serrulate. Flowers solitary, lateral, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, shortly pedicelled. Bracts 3-6, with broad sheathing bases, tips pungent, often exceeding the flower. Sepals ovate-lanceolate, acute, as long as the corolla-tube. Corolla-lobes ovate-triangular, acute. Capsule broadly obovoid, enclosed in the persistent calyx-lobes.—*D. acerosum*, Berggr. in *Minnesk. Fisiog. Sallsk. Lund.* (1877) 15.

Var. *acicularifolium*.—Leaves much longer, 2-4 in., narrowed into long acicular points; sheaths broader, auricled at the tips.

Var. *virgatum*.—Whole plant purplish-brown. Branches long, very slender, sparingly leafy. Leaves small, $\frac{1}{4}$ - $\frac{3}{4}$ in. long. Bracts with pale membranous margins.

SOUTH ISLAND: Abundant in mountain districts from Nelson to Foveaux Straits. Var. *acicularifolium*: Broken River basin, and other localities in the mountains of Canterbury, Kirk! Enys! T. F. C. Var. *virgatum*: Westland—Near Kumara, Kirk! Denniston, J. Caffin! 2000-4500 ft. December-March.

16. *D. rosmarinifolium*, R. Br. *Prodr.* 556.—A depressed or prostrate, rarely suberect, much-branched rigid woody shrub 3-12 in. high; branches stout, spreading, leafy at the tips. Leaves erect or spreading, rigid, straight or curved, $\frac{1}{4}$ - $\frac{3}{4}$ in. long; sheathing base short, $\frac{1}{8}$ in. wide; blade $\frac{1}{20}$ in. wide at the base, very thick and coriaceous, convex at the back, flat or concave in front, tip trigonous, obtuse or rarely subacute, margins entire or very minutely scabrid. Flowers solitary, terminating the branchlets and often confined to the lateral ones, $\frac{1}{8}$ in. long. Bracts numerous, with broad sheathing bases and subulate tips. Sepals ovate, acute, about as long as the corolla-tube. Corolla-lobes ovate, acute.—*A. Rich. Fl. Nouv. Zel.* 220; *A. Cunn. Precur.* n. 414; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 171; *Handb. N.Z. Fl.* 183. *Epacris rosmarinifolia*, Forst. *Prodr.* n. 67.

Var. *politum*.—Stems long and creeping or short and tufted, sometimes forming compact masses. Leaves numerous, densely imbricated in many series, erect and appressed to the branch, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, red-brown, convex and smooth and polished on the back, concave in front, tips very obtuse. Flowers almost hidden by the leaves.

NORTH ISLAND: Tararua Range, *Buchanan*! SOUTH ISLAND, STEWART ISLAND: Common in mountain districts throughout. Var. *politum*: Maungatua, near Dunedin, *Petrie*! Mount Anglem and Smith's Lookout (Stewart Island), *Kirk*! 2500-5500 ft. December-March.

17. **D. prostratum**, *T. Kirk in Trans. N.Z. Inst.* xiii. (1881) 384. — A small prostrate species; stems 3-12 in. long, sometimes slender and sparingly divided, sometimes robust and copiously branched, but the branches never so closely compacted as in *D. muscoides*. Leaves imbricating, erect, incurved when dry, $\frac{1}{8}$ - $\frac{1}{4}$ in. long; sheathing base short, with broad thin margins, narrowed into a linear-subulate blade, which is obtuse or subacute at the tip, coriaceous, convex at the back, flat or slightly concave in front, curved, margins minutely serrulate. Flowers solitary, terminating the branches, $\frac{1}{8}$ in. long, white. Sepals ovate, subacute, rather shorter than the corolla-tube. Corolla-lobes broadly ovate-triangular.

SOUTH ISLAND: Otago—Mountains above Lake Harris; Longwood Range, *Kirk*! Maungatua, Clinton Valley, and Blue Mountains, *Petrie*! 1000-4000 ft.

Differs from *D. muscoides* in the larger size and much more lax habit, and in the longer leaves, which are not so closely imbricated; but some of Mr. Petrie's specimens are almost intermediate.

18. **D. muscoides**, *Hook. f. Handb. N.Z. Fl.* 183. — A small densely tufted rigid little plant, forming rounded masses a few inches in diameter; branches short, densely packed, clothed with minute closely imbricating leaves. Leaves $\frac{1}{10}$ - $\frac{1}{8}$ in. long, very thick and coriaceous, rigid, concave; sheathing base about half the length, broadly ovate, margins thin; tip short, subulate, polished, semiterete, obtuse or more rarely subacute. Flower solitary, terminal, $\frac{1}{8}$ in. long, white. Sepals ovate, subacute, as long as the corolla. Corolla-tube short and broad, cylindrical; lobes very broad, obtuse or subacute.

SOUTH ISLAND: Otago—Mount Alta and Hector's Col, *Buchanan*! Old Man Range, Hector Mountains, Mount Pisa, Mount St. Bathans, *Petrie*! 4000-6000 ft.

In the Index Kewensis this is referred to the Tasmanian *D. minimum*; but, judging from a scrap of that species received from the late Baron Mueller, it differs in the more rigid habit and shorter and more closely imbricated leaves, which are also thicker and not nearly so acute.

ORDER XLIV. PRIMULACEÆ.

Perennial or more rarely annual herbs. Leaves all radical, or cauline, and if so, opposite or alternate or whorled; stipules wanting. Flowers hermaphrodite, regular. Calyx usually inferior (half-superior in *Samolus*), 4-9-lobed or -partite. Corolla gamopetalous, with as many lobes as divisions of the calyx, lobes imbricate or contorted. Stamens equal in number to the corolla-lobes and

opposite to them, sometimes alternating with staminodia, inserted in the tube or at the base of the corolla; anthers 2-celled, introrse. Ovary superior (inferior in *Samolus*), 1-celled; style short or long, stigma usually capitate; ovules 2 or more, attached to a free central placenta. Fruit a 1-celled capsule, 2-6-valved or dehiscent transversely. Seeds 2 to many, minute, angular; albumen fleshy or horny; embryo small, transverse.

A small order, comprising 20 genera and 250 species; widely spread, but most plentiful on the mountains of the north temperate zone, rare in the tropics, the southern species comparatively few. The properties of the order are insignificant; but it includes many well-known garden-plants, as the primrose, oxlip, auricula, Chinese primrose, cyclamen, &c. The sole New Zealand genus is best represented in the Southern Hemisphere, but one of the species is almost cosmopolitan.

1. SAMOLUS, Tourn.

Annual or perennial herbs. Leaves alternate. Flowers white, in terminal racemes or corymbs. Calyx half-superior, 5-fid, persistent. Corolla perigynous, subcampanulate; tube short; limb 5-lobed or -partite. Stamens 5, affixed to the corolla-tube, alternating with as many staminodes; filaments very short. Ovary globose, adnate to the calyx-tube, the tip free; style short; ovules numerous, anatropous. Capsule globose or ovoid, half-inferior, the free part 5-valved, many-seeded. Seeds minute, orbicular or angled; embryo transverse; hilum basilar.

Species 8, one of them almost cosmopolitan, most of the rest inhabiting various parts of the Southern Hemisphere.

1. *S. repens*, Pers. Syn. i. 171.—A glabrous perennial herb; stems 4-12 in. long, erect, ascending, or prostrate from a tufted rootstock, often emitting creeping and rooting stolons from the base. Leaves fleshy, very variable in size and shape, $\frac{1}{8}$ -1 in. long, obovate or linear-obovate to linear-spathulate or linear, the lower ones usually broader and petiolate, the upper smaller and narrower and often sessile. Flowers about $\frac{1}{4}$ in. diam., axillary or in few-flowered terminal racemes; pedicels longer than the leaves. Calyx-tube adnate to about the middle of the ovary, lobes acute. Corolla broad, the tube usually about as long as the calyx-lobes. Capsule broadly ovoid, $\frac{1}{8}$ - $\frac{1}{5}$ in. diam.—*F. Muell. Veg. Chath. Is.* 34; *Benth. Fl. Austral.* iv. 271. *S. littoralis*, R. Br. Prodr. 428; *A. Rich. Fl. Nouv. Zel.* 185; *A. Cunn. Precur.* n. 372; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 207; *Handb. N.Z. Fl.* 185. *Sheffieldia repens*, Forst. Char. Gen. 18; *Prodr.* n. 67.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Common along the coast, in salt marshes and on rocks. November-January. Also in Australia and Tasmania and New Caledonia.

ORDER XLV. MYRSINEÆ.

Trees or shrubs, usually glabrous. Leaves alternate, undivided, generally provided with pellucid glandular dots; stipules wanting. Flowers regular, hermaphrodite or polygamous. Calyx usually inferior, 4-6-lobed or -partite, segments often ciliate. Corolla gamopetalous (rarely polypetalous), segments (or petals) 4-6, contorted or imbricated. Stamens opposite to the corolla-lobes and equal to them in number, free or adnate to the tube. Anthers oblong, 2-celled, sometimes coherent. Ovary usually superior, 1-celled; style single, stigma generally capitate; ovules few or many, inserted on a free central placenta. Fruit a one- to several-seeded drupe or berry. Seeds roundish or angular; albumen copious, sometimes pitted or ruminant; embryo usually transverse.

An order of considerable size (according to the most recent enumeration including over 30 genera and 900 species), widely spread over the warm regions of the globe, rare or absent in temperate climates, except in New Zealand. Economic properties unimportant. The single genus found in New Zealand has a wide range in the tropics of both hemispheres.

1. MYRSINE, Linn.

Small trees or shrubs. Leaves coriaceous, entire or rarely toothed. Flowers small, polygamous or often dioecious, in sessile or stalked axillary fascicles or umbels or sometimes solitary; usually springing from the nodes on the old wood below the leaves. Calyx small, 4-5-fid, persistent. Corolla 4-5-partite or of 4-5 distinct petals; segments imbricate or rarely valvate, spreading or recurved. Stamens 4-5, inserted near the base of the corolla, filaments short. Ovary superior, 1-celled; style short or altogether absent; stigma capitate or lobed or fringed; ovules few, sunk in a fleshy placenta. Fruit small, globose, drupaceous, dry or fleshy. Seed solitary, usually surrounded by the remains of the placenta; albumen horny; embryo elongated, often curved.

Taken in the sense of the "Genera Plantarum" this is a genus of from 120 to 150 species, most of them natives of tropical Asia, Africa, and America; with comparatively few species in extra-tropical Asia and Africa, in Australia, New Zealand, and Polynesia; the 8 species found in New Zealand being all endemic. In Carl Mez's recent monograph of the order, published in "Das Pflanzenreich," the New Zealand forms are referred to the genera *Suttonia* and *Rapanea*, the first comprising those with absolutely free petals, the second those in which the corolla is more or less gamopetalous. But in the three species which Mez places in *Rapanea* one has the petals absolutely free, and in the two others they only cohere very slightly at the base. Without expressing any opinion as to how far it may be advisable to dismember the original genus *Myrsine*, I certainly think that the New Zealand species form a natural group, and are best kept together. If it is necessary to separate them from *Myrsine*, the characters of *Suttonia* should be enlarged so as to take in the whole of them.

A. *Petals united at the base (often very slightly in M. salicina).*

Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, elliptic or obovate-oblong usually acute

1. *M. kermadecensis.*

Leaves 3–7 in. long, linear or linear-oblong

2. *M. salicina.*

B. *Petals quite free.*

Tree 10–20 ft. Leaves 1–2 in., oblong or obovate, rather thin, margins undulate. Fruit $\frac{1}{8}$ in. diam.

3. *M. Urvillei.*

Tree 10–20 ft. Leaves 1– $2\frac{1}{2}$ in., obovate, coriaceous, margins flat. Fascicles many-flowered. Fruit $\frac{1}{4}$ – $\frac{1}{3}$ in. diam.

4. *M. chathamica.*

Shrub 8–15 ft.; branches stout, pubescent. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., narrow-obovate, coriaceous. Flowers solitary or few together, almost sessile

5. *M. Coxii.*

Shrub 8–15 ft.; branches slender, glabrous. Leaves $\frac{3}{4}$ – $1\frac{1}{4}$ in., obovate, rather thin. Flowers in 2–5-flowered fascicles; pedicels slender, distinct

6. *M. montana.*

Shrub 4–12 ft.; branches spreading, tortuous and interlaced. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., broadly obovate or obcordate, retuse or 2-lobed

7. *M. divaricata.*

Trailing or prostrate shrub 4–18 in. long. Leaves small, $\frac{1}{4}$ – $\frac{1}{3}$ in., broadly oblong or orbicular

8. *M. nummularia*

M. brachyclada, Colenso in Trans. N.Z. Inst. xxii. (1890) 478, is a small state of *Aristotelia fruticosa*.

1. **M. kermadecensis**, *Cheesem. in Trans. N.Z. Inst. xxiv.* (1892) 410.—A small glabrous tree 8–15 ft. high; bark rough, blackish-brown. Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, elliptic-oblong or obovate-oblong, acute or obtuse, narrowed into petioles $\frac{1}{6}$ – $\frac{1}{4}$ in. long, entire, coriaceous, glandular-dotted, veins copiously reticulated, margins slightly recurved. Flowers in many-flowered fascicles on the old wood below the leaves, small, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam., unisexual; pedicels short, $\frac{1}{8}$ – $\frac{1}{6}$ in. long. Calyx minute, 4–5-lobed; lobes short, broad. Corolla divided nearly to the base into 4 or 5 ovate acute lobes, which are fringed on the margins. Anthers nearly as large as the lobes. Female flowers not seen. Fruit globose, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., black when fully ripe, 1-seeded.—*Rapanea kermadecensis*, *Mez in Pflanzenreich*, Heft 9, 371.

KERMADEC ISLANDS: Sunday Island, abundant throughout, T. F. C. Sea-level to 1500 ft. August.

This and the following are the only New Zealand species in which the petals cohere at the base.

2. **M. salicina**, *Heward in Hook. Lond. Journ. Bot. i.* (1842) 283, *in note*.—A small tree 15–30 ft. high, perfectly glabrous in all its parts; bark black or dark-red; branches usually leafy at the tips only. Leaves spreading, 3–7 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, linear or linear-oblong, obtuse, narrowed into a short stout petiole, quite entire, marked with oblong pellucid glands, veined, margins flat. Flowers in dense many-flowered fascicles on the branches below

the leaves, hermaphrodite, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam. Calyx 5-lobed; lobes rounded, ciliate. Petals 5, oblong, revolute, cohering at the base. Stamens 5, affixed to the base of the petals. Drupe oblong, $\frac{1}{3}$ in. long, red, 1- or rarely 2-seeded.—*Hook. f. Handb. N.Z. Fl.* 184; *Kirk, Forest Fl.* t. 15. *Suttonia salicina*, *Hook. f. Fl. Antarct.* i. 52; *Fl. Nov. Zel.* i. 172, t. 44. *Rapanea salicina*, *Mez in Pflanzenreich*, Heft 9, 370.

NORTH AND SOUTH ISLANDS: Not uncommon in woods from the North Cape to Marlborough and Westland. Sea-level to 2800 ft. *Toro*. September–December.

Wood dark-red, prettily marked; often employed by cabinetmakers for inlaying.

3. *M. Urvillei*, *A. D.C. in Trans. Linn. Soc.* xvii. (1834) 105.—A small closely branched tree 10–20 ft. high; bark dark-brown or black, red on the young branches. Leaves alternate, spreading, 1–2 in. long, oblong or obovate-oblong, obtuse, shortly petiolate, thinly coriaceous, glabrous or the midrib puberulous above, veined, dotted with rounded pellucid glands, margins strongly undulate. Flowers crowded in fascicles on the branches below the leaves or axillary, small, $\frac{1}{15}$ – $\frac{1}{10}$ in. diam., whitish, unisexual; pedicels short. Calyx small, 4-lobed; lobes sometimes wanting. Petals 4, quite free, revolute. Male flowers with 4 stamens and an abortive ovary; anthers as large or larger than the petals. Female flowers much smaller; anthers smaller, empty. Ovary with a large sessile fringed stigma. Fruit small, rounded, $\frac{1}{8}$ in. diam., black when fully ripe.—*A. Cunn. Precur.* n. 405; *Raoul, Choix*, 44; *Hook. f. Handb. N.Z. Fl.* 184; *Kirk, Forest Fl.* t. 16. *M. Richardsoniana*, *Endl. in Ann. Wien. Mus.* i. (1836) 171. *Rapanea Urvillei*, *Mez in Pflanzenreich*, Heft 9, 371. *Suttonia australis*, *A. Rich. Fl. Nouv. Zel.* 249, t. 38; *Hook. f. Fl. Nov. Zel.* i. 172.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in woods from the North Cape southwards. Sea-level to 3000 ft. *Mapau*; *Tipau*. March–April.

4. *M. chathamica*, *F. Muell. Veg. Chath. Is.* 38, t. 7.—A small tree 10–20 ft. high with dark bark; branches stout, the ultimate ones pubescent with short stiff hairs. Leaves 1–2 $\frac{1}{2}$ in. long, obovate, obtuse or emarginate at the tip, narrowed into a short stout petiole, entire, thick and coriaceous, glabrous or pubescent along the midrib, flat, glandular-dotted, veins reticulated on both surfaces. Flowers in many-flowered fascicles on the branches below the leaves or occasionally axillary, small, $\frac{1}{10}$ in. diam., unisexual; pedicels $\frac{1}{8}$ – $\frac{1}{4}$ in. long, rather stout. Calyx 4-lobed; lobes deltoid, ciliate. Petals 4, quite free, oblong, obtuse, fimbriate, densely studded with reddish glands. Anthers almost as large as the petals. Ovary 1-celled; stigma sessile, capitate. Fruit globose, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., purplish, 1-seeded.—*Hook. f. Handb. N.Z. Fl.* 736. *Suttonia chathamica*, *Mez in Pflanzenreich*, Heft 9, 333.

CHATHAM ISLANDS: Abundant in woods, *H. H. Travers*! *Cox* and *Cockayne*!
 STEWART ISLAND: Not common, *G. M. Thomson*, *Kirk*! August–September.

5. *M. Coxii*, *Cockayne in Trans. N.Z. Inst.* xxxiv. (1902) 318.
 —A closely branched shrub 8–15 ft. high; bark rough, dark-brown; ultimate branchlets more or less pubescent with short stiff white hairs. Leaves alternate or crowded on short lateral branchlets, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, narrow obovate, obtuse or emarginate, gradually narrowed into a short petiole, entire, coriaceous, glandular-dotted, veins finely reticulated on both surfaces; margins flat, ciliated when young. Flowers in fascicles of 2 or 3 on the branches below the leaves, rarely solitary in the axils of the leaves, small, almost sessile but the pedicels lengthening in fruit. Calyx 4-lobed; lobes deltoid, ciliate. Petals 4, quite free, obovate-oblong, obtuse, ciliate, marked with reddish glands. Anthers almost as large as the petals. Stigma sessile, capitate. Fruit about $\frac{1}{4}$ in. diam., globose, purplish, 1-seeded.—*Suttonia Coxii*, *Cockayne in Trans. N.Z. Inst.* xxxv. (1903) 359.

CHATHAM ISLANDS: Not uncommon in swampy forests, *Cox* and *Cockayne*! July–August.

Closely allied to the preceding, but distinguished by the smaller size, smaller and proportionately narrower leaves, few-flowered fascicles, and almost sessile flowers. Mr. Cockayne informs me that it has creeping underground stems, which at intervals put up erect branches.

6. *M. montana*, *Hook. f. Handb. N.Z. Fl.* 184.—A perfectly glabrous shrub or small tree 8–15 ft. high; bark dark red-brown. Leaves alternate, $\frac{3}{4}$ – $1\frac{1}{4}$ in. long, narrow-obovate, obtuse or emarginate, gradually narrowed into a short slender petiole, coriaceous or almost membranous, quite glabrous, glandular-dotted, veins reticulated on both surfaces, cuticle beneath sometimes loose and wrinkled when dry; margins flat or slightly recurved, sometimes obscurely sinuate towards the tip. Flowers in 2–5-flowered fascicles on the branches below the leaves, rarely solitary, small, $\frac{1}{8}$ in. diam., unisexual; pedicels rather slender, about $\frac{1}{8}$ in. long. Calyx 4-lobed; lobes oblong, rounded. Petals 4, quite free, obovate-oblong, obtuse, revolute, ciliate. Anthers nearly as large as the lobes. Female flowers not seen. Fruit globose, $\frac{1}{10}$ in. diam.—*M. neo-zealandensis*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 479. *Suttonia montana*, *Hook. f. Fl. Nov. Zel.* ii. 334; *Mez in Pflanzenreich*, Heft 9, 334. *S. neo-zealandensis*, *Mez, l.c.*

NORTH ISLAND: Ruahine Range and Hawke's Bay, *Colenso*! SOUTH ISLAND: Marlborough—Mount Stokes, *McMahon*! Nelson—Maitai Valley, *T. F. C.*; near Westport, *W. Townson*! Sea-level to 3000 ft.

Mez keeps up *M. neo-zealandensis* as a distinct species, but an examination of the type specimens in Mr. Colenso's herbarium has convinced me that it cannot be retained even as a variety.

7. *M. divaricata*, *A. Cunn. Precur.* n. 406.—A much-branched shrub 4–12 ft. high, with the habit of a small-leaved *Coprosma*; bark rough, dark-brown; branches spreading, rigid, interlaced, often deflexed at the tips; branchlets usually pubescent. Leaves alternate or fascicled on short lateral branchlets, small, spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, broadly obovate or obcordate, obtuse or retuse or 2-lobed at the tip, narrowed into a short petiole, coriaceous, glabrous, glandular-dotted, veins reticulated on both surfaces, cuticle often wrinkled beneath when dry; margins flat or slightly recurved, ciliate when young. Flowers in few-flowered fascicles or solitary, minute, $\frac{1}{12}$ – $\frac{1}{10}$ in. diam. Calyx 4-lobed; lobes ovate, obtuse. Petals 4 (rarely 5), quite free, obovate, revolute. Anthers almost as large as the petals. Style short; stigma capitate, lobed or crenate. Fruit depressed-globose, $\frac{1}{8}$ in. diam., purplish.—*Raoul, Choix*, 44; *Hook. f. Handb. N.Z. Fl.* 184. *M. pendula*, *Col. in. Trans. N.Z. Inst.* xxi. (1889) 94. *Suttonia divaricata*, *Hook. f. Fl. Antarct.* i. 51, t. 34; *Fl. Nov. Zel.* i. 173; *Mez in Pflanzenreich*, Heft 9, 334.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: From Kaitaia and Mongonui southwards, but local to the north of the Waikato River. Sea-level to 4000 ft. August–October.

A very variable plant, but easily recognised by its mode of growth, which much resembles that of a small-leaved *Coprosma*.

8. *M. nummularia*, *Hook. f. Handb. N.Z. Fl.* 184.—A very small prostrate or trailing shrub, with slender straggling branches 4–18 in. long; bark dark red-brown. Leaves small, spreading, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, broadly oblong or obovate to orbicular, obtuse or minutely apiculate, shortly petiolate, coriaceous, glabrous, finely reticulated above, often wrinkled beneath, dotted with numerous rounded pellucid glands; margins slightly recurved, ciliate when young. Flowers minute, solitary or in fascicles of 2 or 3, axillary or on the branches below the leaves. Calyx very small, 4-lobed; lobes ovate, obtuse. Petals 4, quite free, obovate, concave, ciliate. Anthers almost as large as the petals. Female flowers smaller than the males. Ovary conical, narrowed above; stigma large, irregularly lobed or expanded. Fruit globose, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., bluish-purple.—*Suttonia nummularia*, *Hook. f. Fl. Nov. Zel.* i. 173, t. 45; *Mez in Pflanzenreich*, Heft 9, 335.

NORTH ISLAND: Ruapehu, *Petrie! Rev. F. H. Spencer!* Ruahine Range and Lake Rotoatara, *Colenso!* Upper Rangitikei, *Buchanan!* SOUTH ISLAND: Mountainous districts from Nelson to Foveaux Strait, but not very common. STEWART ISLAND: Mount Anglem, *Kirk!* 2000–5000 ft. December–January.

ORDER XLVI. SAPOTACEÆ.

Trees or shrubs, often with milky juice. Leaves alternate, coriaceous, entire; stipules usually wanting. Flowers regular, hermaphrodite or occasionally polygamous, axillary, solitary or

clustered. Calyx inferior, 4-8-lobed or -partite; lobes imbricate. Corolla gamopetalous, hypogynous, tube short, lobes as many or 2-4 times as many as the divisions of the calyx. Stamens inserted on the tube of the corolla and opposite to the lobes, either as many or twice as many as the lobes, sometimes alternating with staminodia. Ovary superior, 2-8-celled; style simple, straight; stigma punctiform, simple or lobed; ovules solitary in each cell, attached to the inner angle. Fruit a 1- to many-celled berry, frequently 1-celled and 1-seeded by abortion. Seeds often with the testa crustaceous and shining; albumen present or wanting; embryo straight, radicle inferior.

A small order, widely distributed in the tropics of both hemispheres, but almost unknown in temperate regions. Genera 25; species not far from 350, many of them imperfectly known. The order includes several species useful to man, the most important being the Malayan *Isonandra gutta*, which produces gutta-percha. The star-apple (*Chrysophyllum Cainita*) and the African butter-tree (*Bassia Parkii*) are edible species, and there are several others not so well known. The New Zealand genus is widely spread in tropical countries.

1. SIDEROXYLON, Linn.

Trees or shrubs, glabrous or pubescent. Leaves alternate, coriaceous, exstipulate. Flowers usually small, in axillary fascicles, sessile or pedicelled. Calyx-segments 5, much imbricated, subequal. Corolla subcampanulate; lobes 5, imbricated. Stamens 5, affixed to the throat of the corolla and opposite to the lobes; filaments short or long; anthers ovate or lanceolate. Staminodia 5, alternating with the stamens. Ovary glabrous or villous, 5- or rarely 2-4-celled; style cylindric, short or long. Berry ovoid or globose; seeds often solitary by abortion, sometimes 2-5, usually oblong, compressed; testa hard, crustaceous or bony; albumen fleshy; cotyledons flat, broad, often foliaceous; radicle short.

Species about 80, chiefly found in the tropical regions of both hemispheres.

1. **S. costatum**, F. Muell. *First Census Austral. Pl.* 92.—A handsome closely branched tree 20-40 ft. high; trunk 1-3 ft. diam.; branchlets clothed with appressed pubescence. Leaves 2-4 in. long, elliptic-obovate or oblong-obovate, obtuse, narrowed into petioles $\frac{1}{4}$ - $\frac{1}{2}$ in. long, quite entire, coriaceous, shining, glabrous except the petiole and midrib, which are finely puberulous, primary veins parallel, diverging from the midrib almost at right angles. Flowers axillary or from the nodes below the leaves, solitary or 2 together, small, $\frac{1}{8}$ - $\frac{1}{6}$ in. diam., polygamous; peduncles stout, curved, $\frac{1}{4}$ - $\frac{1}{2}$ in. long. Calyx-segments 4 or 5, broadly oblong or ovate, concave, ciliate. Corolla slightly exceeding the calyx, 4-5-partite to below the middle. Stamens as many as the corolla-segments; filaments short, thick. Staminodia subulate. Ovary 4-5-celled. Berry large, 1 in. long, broadly oblong or obovoid. Seeds 1 to 4, but usually 2 or 3, almost as long as the fruit, smooth

and polished, bony, elliptical, curved.—*Kirk, Forest Fl.* t. 133. *Sapota costata*, *A. D.C. in D.C. Prodr.* viii. 175; *Hook. f. Fl. Nov. Zel.* i. 174; *Handb. N.Z. Fl.* 186. *Achras costata*, *Endl. Prodr. Fl. Ins. Norfl.* 49; *A. Cunn. Precur.* n. 404; *Raoul, Choix*, 44. *A. novo-zealandica*, *F. Muell. Fragm.* ix. 72.

NORTH ISLAND: Islands and rocky headlands from the North Cape to the East Cape and Tolago Bay, not common. Ascends to 1500 ft. on the Little Barrier Island. *Tawapou.*

Also on Norfolk Island, where the flowers are said to be uniformly pentamerous, while in New Zealand they are chiefly tetramerous, especially the females. The wood is hard, white, and durable; and the bony seeds were formerly used for necklaces by the Maoris.

ORDER XLVII. OLEACEÆ.

Trees or shrubs, often climbing. Leaves opposite, very rarely alternate, simple or 3-foliate or pinnate, entire or toothed; stipules wanting. Flowers regular, hermaphrodite or unisexual, usually in axillary or terminal cymes or panicles or racemes, rarely clustered. Calyx inferior, usually small; limb 4-5-toothed or -lobed or wanting. Corolla hypogynous, gamopetalous and 4-5-partite, or of 4 free petals, sometimes wanting (always so in the New Zealand species). Stamens 2, inserted on the corolla or hypogynous; filaments usually short; anthers large, 2-celled. Ovary superior, 2-celled; style short or long; stigma entire or lobed; ovules usually 2 in each cell, seldom more, attached to the inner angle. Fruit a drupe or berry, or a 2-valved loculicidal capsule, 2-celled, or by abortion 1-celled. Seeds solitary or 2 in each cell, erect or pendulous; albumen present or absent; embryo straight, radicle inferior or superior.

An order of about 20 genera and almost 300 species, widely spread through most temperate and tropical regions. From an economical point of view it is chiefly important from including the well-known olive, which yields the most valuable of vegetable oils. The various kinds of jasmines and the lilac are common garden-plants belonging to the order. The New Zealand genus is mainly found in the north temperate zone, but also occurs in South Africa, Norfolk Island, and Australia.

1. OLEA, Linn.

Trees or shrubs. Leaves opposite, entire or rarely toothed. Flowers small, hermaphrodite or unisexual, in axillary or terminal panicles. Calyx small, 4-toothed or -lobed. Corolla with a short tube and 4 induplicate-valvate lobes, wanting in the New Zealand species. Stamens 2, rarely 4, epipetalous or hypogynous; filaments short; anthers oblong. Ovary 2-celled; style short; stigma obtuse, capitate or 2-lobed; ovules 2 in each cell, pendulous or laterally attached. Fruit a drupe; endocarp bony or crustaceous. Seeds solitary or rarely 2; albumen fleshy; radicle superior.

A genus of about 35 species, scattered through the temperate and tropical regions of the Old World. The New Zealand species constitute the section *Gymnelæa*, characterized by the absence of the corolla, and by the stamens being hypogynous.

* Leaves of young plants broader than those of the adult.

Leaves of adult trees $1\frac{1}{2}$ -3 in. \times $1-1\frac{1}{2}$ in., elliptic-oblong.

Racemes glabrous 1. *O. apetala*.

** Leaves of young plants narrower than those of the adult.

Leaves 3-6 in. \times $\frac{3}{4}-1\frac{3}{4}$, lanceolate to ovate-lanceolate.

Racemes stout, pubescent, 8-18-flowered 2. *O. Cunninghamii*.

Leaves 2-4 in. \times $\frac{1}{2}-\frac{3}{4}$ in., lanceolate. Racemes slender,

glabrous or nearly so, 6-12-flowered 3. *O. lanceolata*.

Leaves $1\frac{1}{2}-3\frac{1}{2}$ in. \times $\frac{1}{4}-\frac{1}{2}$ in., linear or linear-lanceolate.

Racemes slender, glabrous, 5-10-flowered 4. *O. montana*.

1. *O. apetala*, Vahl *Symb. Bot.* iii. 3.—A much-branched dioecious shrub or small tree 8-20 ft. high, everywhere perfectly glabrous; bark greyish-brown, thick and furrowed; branches spreading, often tortuous. Leaves very variable, in young plants larger and broader, 3-5 in. long, 2-3 in. broad, broadly oblong or ovate, subacute; of adult trees $1\frac{1}{2}$ -3 in. long, $1-1\frac{1}{2}$ in. broad, elliptic-oblong or elliptic-ovate, acute or acuminate, shortly petiolate, coriaceous, glossy, both surfaces slightly rough to the touch, quite entire, midrib prominent. Racemes axillary or on the branches below the leaves, glabrous, $1-1\frac{1}{2}$ in. long, 10-18-flowered; pedicels slender. Flowers minute, $\frac{1}{10}$ in. diam., females alone seen. Calyx-lobes unequal. Petals wanting. Ovary 2-celled; stigma large, 2-lobed; lobes spreading. Drupe oblong, $\frac{1}{3}$ in. long, red.—*Endl. Prodr. Fl. Ins. Norf.* 56; *Kirk in Trans. N.Z. Inst.* iii. 165; *Forest Fl.* t. 27, 28.

NORTH ISLAND: Whangarei Heads, *Buchanan! T. F. C.*; Taranga Islands (Hen and Chickens), Great and Little Barrier Islands, *Kirk! T. F. C.*; Fanal Island, *Miss Shakespear! Cuvier Island, T. F. C.*

I have followed Kirk in identifying this with the Norfolk Island plant described by Endlicher, but I have had no opportunity of comparing the two.

2. *O. Cunninghamii*, Hook. f. *Fl. Nov. Zel.* i. 175.—A lofty dioecious forest-tree 30-60 or even 70 ft. high, with a trunk 2-5 ft. diam.; young branchlets pubescent. Leaves coriaceous, very variable; of young plants long and narrow, 6-10 in. long, $\frac{1}{3}-\frac{2}{3}$ in. broad, narrow linear, acute; of adult trees 3-6 in. long, $\frac{3}{4}-1\frac{3}{4}$ in. broad, lanceolate to ovate-lanceolate or oblong-lanceolate, obtuse or subacute, shortly petiolate, glabrous, slightly rough on both surfaces; veins impressed above, somewhat obscure, midrib prominent beneath. Racemes $\frac{1}{2}$ -1 in. long, stout, densely pubescent, 8-18-flowered; pedicels short, stout; bracts ovate, concave, deciduous. Flowers minute, apetalous. Calyx unequally 4-lobed. Male flowers with 2 large exerted anthers and an abortive ovary;

females with 2 sessile empty anthers and an oblong-ovoid ovary with a large 2-lobed stigma. Drupe $\frac{1}{2}$ – $\frac{2}{3}$ in. long, ovoid, 1- or rarely 2-seeded, red.—*Handb. N.Z. Fl.* 186; *Kirk, Forest Fl.* t. 59, 59a, 59b. *O. apetalata*, *A. Cunn. Precur.* n. 403 (not of Vahl).

NORTH ISLAND: Forests from the North Cape to Cook Strait, not common north of the Waikato River. SOUTH ISLAND: Marlborough, extremely rare; Pelorus Sound, Kaikoura, Conway River, *J. Rutland!* Sea-level to 2500 ft. *Maire*; *Maire-rau-nui*; *Black-maire*. October–November.

Wood dark-brown, often streaked with black; very hard, dense, and heavy; serviceable for any purpose requiring great strength and durability.

3. *O. lanceolata*, *Hook. f. Fl. Nov. Zel.* i. 176.—A closely branched round-headed dioecious tree 20–50 ft. high; trunk 1–3 ft. diam.; branches more slender than in *O. Cunninghamii*, often with white bark. Leaves coriaceous, smooth and glossy; of young trees 3–6 in. long, narrow-linear, acuminate; of adult plants 2–4 in., linear-lanceolate to ovate-lanceolate, acute or acuminate, shortly petiolate, glabrous, veins usually prominent on both surfaces. Racemes $\frac{1}{3}$ – $\frac{3}{4}$ in. long, very slender, glabrous or nearly so, 6–12-flowered; pedicels long, slender. Flowers minute, apetalous. Calyx unequally 4-lobed. Male flowers with 2 or 4 large exerted anthers. Drupe about $\frac{1}{2}$ in. long, ovoid, red or orange.—*Handb. N.Z. Fl.* 187; *Kirk, Forest Fl.* t. 60, 61.

NORTH ISLAND: Abundant in woods from the North Cape to Cook Strait. SOUTH ISLAND: Vicinity of Nelson, Wairoa Valley, *Kirk! T. F. C.*; Kaituna and Rai Valley, *J. Rutland!* Sea-level to 2000 ft. *Maire*; *White-maire*. November–January.

Very close to the preceding, from which it differs in the smaller size and more slender habit, smaller and smoother leaves, and especially in the smaller and much more slender almost glabrous racemes. The wood is very similar to that of *O. Cunninghamii*, and equally durable.

4. *O. montana*, *Hook. f. Fl. Nov. Zel.* i. 176, t. 46 A and B.—A much-branched round-headed dioecious tree, 20–50 ft. high or more; trunk rather slender, 1–2 ft. diam.; bark greyish-brown; branches slender, the younger ones pubescent at the tips. Leaves of young plants 3–6 in. long, $\frac{1}{6}$ – $\frac{1}{4}$ in. broad, narrow-linear; of adult trees $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, linear or linear-lanceolate, obtuse or acute, very shortly petioled, coriaceous, glabrous, shining; veins very obscure. Racemes axillary or on the branches below the leaves, slender, glabrous, 5–10-flowered; pedicels slender. Flowers minute, apetalous. Calyx unequally 4-lobed; lobes broad, obtuse. Drupe $\frac{1}{4}$ – $\frac{1}{3}$ in. long, narrow-ovoid, red.—*Handb. N.Z. Fl.* 187; *Kirk, Forest Fl.* t. 29, 30.

NORTH ISLAND: Forests from Whangaroa and Hokianga southwards to Cook Strait, but rare north of the Upper Waikato. SOUTH ISLAND: Marlborough—Rai Valley, *J. Rutland!* Nelson—Near Brightwater, *Kirk!* Sea-level to 2500 ft. *Orooro*; *Narrow-leaved Maire*. November–January.

ORDER XLVIII. **APOCYNACEÆ.**

Erect or climbing shrubs, rarely trees or herbs, juice often milky. Leaves opposite or whorled, very rarely alternate, simple and entire; stipules wanting. Flowers regular, hermaphrodite, usually in axillary or terminal cymes. Calyx inferior, 4-lobed or -partite; lobes imbricate, often glandular at the base. Corolla gamopetalous, hypogynous, funnel- or salver-shaped; tube often hairy or scaly within; lobes 5, rarely 4, spreading, usually contorted in the bud. Stamens 5, rarely 4, inserted on the tube of the corolla; filaments short; anthers often sagittate, either free or connate and adhering to the stigma; pollen granular. Ovary superior, usually composed of 2 carpels connate only by their styles, but in one tribe the carpels are wholly combined into a 2-celled ovary with axile placentas or into a 1-celled ovary with 2 parietal placentas; ovules 2 or several or many; style single or separated at the base only, thickened above; stigma entire or 2-fid, often constricted in the middle. Fruit generally of 2 follicles opening along the inner edge, sometimes a drupe or berry. Seeds various, often with a tuft of silky hairs; albumen generally present; embryo straight, radicle usually superior.

A large order, abundantly represented in the tropics of both hemispheres, less plentiful in extra-tropical warm regions, and decidedly rare in the temperate zones. Genera about 100; species under 1000. The order includes many poisonous plants, some (as the ordeal-tree of Madagascar, *Tanghinia venenifera*) being exceedingly virulent. Others are employed medicinally as drastic purgatives or febrifuges. A few species yield indiarubber, but on the whole the family is not of much economic importance. The flowers are often of considerable beauty, and many genera are cultivated in gardens or greenhouses. The single New Zealand genus extends through Australia to India and Ceylon.

1. **PARSONSIA**, R. Br.

Twining shrubs, with long slender branched stems, often woody below. Leaves opposite. Flowers small, in terminal or axillary corymbose cymes. Calyx 5-partite, naked or glandular within or furnished with 5 scales. Corolla salver-shaped; tube short, cylindrical or nearly globular, throat naked; lobes 5, spreading, the edges overlapping to the right. Stamens inserted about the middle of the corolla-tube or below it; filaments often twisted; anthers included or exserted, cohering in a cone or ring round the stigma, cells produced into 2 rigid empty basal lobes. Hypogynous scales 5. Ovary 2-celled; style slender; ovules numerous in each cell. Fruit elongated, cylindric, of 2 coherent follicles which ultimately more or less separate from one another. Seeds linear or oblong, numerous, with a tuft of long silky hairs at the tip.

A small genus of about 12 species, found in tropical Asia, the Malay Archipelago, Australia, and New Zealand. Both the New Zealand species are endemic.

Flowers $\frac{1}{4}$ in. long. Calyx $\frac{1}{3}$ as long as the corolla-tube.

 Anthers included 1. *P. heterophylla*.

Flowers $\frac{1}{3}$ in. long. Calyx about as long as the corolla-

 tube. Anthers exerted 2. *P. capsularis*.

1. *P. heterophylla*, A. Cunn. *Precur.* n. 402.—A tall and slender branching climber, often ascending trees to a considerable height; stems tough and pliant, in old specimens woody towards the base; young branchlets terete, more or less pubescent. Leaves extraordinarily variable in size and shape; of young plants 1–5 in. long, narrow-linear, linear- or oblong-spathulate, or linear-oblong, entire or irregularly sinuate or provided with 2–4 rounded lobes on each side, sometimes linear and expanding at the tip into an oblong or rounded blade; of mature plants $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, usually from ovate or oblong-ovate to ovate-lanceolate or elliptic-lanceolate, sometimes obovate, more rarely narrower and lanceolate or linear, acute, petiolate, coriaceous, deep shining green above, paler beneath, veins transverse. Cymes large, many-flowered, $1\frac{1}{2}$ –4 in. long, terminal and axillary. Flowers white, sweet-scented, $\frac{1}{4}$ in. long. Calyx-lobes about $\frac{1}{3}$ as long as the corolla-tube. Corolla with a long tube often inflated below the throat; lobes much shorter than the tube. Anthers included within the corolla-tube. Capsule 3–6 in. long, terete, acute.—*Hook. f. Fl. Nov. Zel.* i. 181. *P. albiflora*, *Raoul, Choix*, 17. *Hook. f. Handb. N.Z. Fl.* 187. *P. variabilis*, *Lindl. in Journ. Hort. Soc.* v. (1850) 196. *P. macrocarpa*, *Col. in Trans. N.Z. Inst.* xiv. (1882) 331.

NORTH AND SOUTH ISLANDS: Abundant from the Three Kings Islands and the North Cape to Foveaux Strait. Sea-level to 2500 ft. *Kaiku*; *Kaiwhiria*. November–March.

I have restored Cunningham's name for this species, it having at least five years' priority over that of Raoul.

2. *P. capsularis*, *R. Br. in Mem. Wern. Soc.* i. (1809) 65.—Habit of *P. heterophylla*, but smaller and more slender. Leaves equally variable, of young plants $\frac{3}{4}$ –3 in. long, narrow-linear or lanceolate to spathulate, entire or sinuate or irregularly lobed; of adult plants varying from extremely narrow-linear, 1–4 in. long by sometimes barely $\frac{1}{10}$ in. broad, to oblong or oblong-lanceolate, 1– $2\frac{1}{2}$ in. long by $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, obtuse or subacute, coriaceous; margins usually entire. Cymes few or many-flowered, axillary and terminal, usually shorter than the leaves. Flowers small, $\frac{1}{8}$ in. long. Calyx-lobes equalling the corolla-tube or very little shorter. Corolla campanulate, tube short; lobes revolute, as long as the tube. Anthers exerted.—*A. D.C. in D.C. Prodr.* viii. 401 (*in part*); *Raoul, Choix*, 17; *Hook. f. Fl. Nov. Zel.* i. 180. *P. rosea*, *Raoul, l.c.* 16; *Hook. f. l.c.*; *Handb. N.Z. Fl.* 188. *P. Forsteri*, *G. Don. Gen. Syst.* iv. 79. *P. ochracea*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 480. *Periploca capsularis*, *Forst. Prodr.* n. 126; *A. Rich. Fl. Nouv. Zel.* 205.

NORTH AND SOUTH ISLANDS: From the North Cape to Foveaux Strait, not uncommon. Sea-level to 2000 ft. *Aka-kiove*. November–March.

Easily separated from the preceding by the smaller campanulate flowers with a short tube and exserted anthers. Forster's diagnosis, and A. Richard's description, drawn up from some of Forster's own specimens, prove beyond doubt that this species is the original *Periploca capsularis*. There seems to be no sufficient reason for sinking the specific name in favour of the much later one bestowed by Raoul.

ORDER XLIX. LOGANIACEÆ.

Herbs, shrubs, or trees. Leaves opposite, usually connected by interpetiolar stipules or by a raised line, simple, entire or toothed. Flowers regular, hermaphrodite or unisexual by abortion. Calyx inferior, 4–5-lobed or -partite; lobes valvate or imbricate or contorted. Stamens 4–5, inserted on the tube of the corolla and alternate with its lobes; anthers 2-celled, with longitudinal dehiscence. Ovary superior, 2-celled or rarely 3–5-celled; style simple; stigma capitate or 2-lobed; ovules 1 or more in each cell. Fruit a 2-celled capsule with septicidal dehiscence or an indehiscent berry. Seeds 1 or more to each cell; albumen copious; embryo straight, long or short.

Distribution chiefly tropical and subtropical, with a few species in temperate North America and in the south temperate zone. Genera 30; species about 350. The order must be considered a dangerous one, including a large proportion of highly poisonous plants. Strychnine is obtained from the seed of *Strychnos nux-vomica*, a common Indian tree; and a substance called *curare*, derived from the bark of two species of *Strychnos*, is used by the South American Indians to poison their arrows.

Herbs. Flowers 4-merous. Corolla-lobes valvate. Capsule didymous, truncate or 2-lobed	1. MITRASACME.
Herbs or shrubs. Flowers 5-merous. Corolla-lobes imbricate. Capsule ovoid or oblong	2. LOGANIA.
Shrubs. Flowers 5-merous. Corolla-lobes contorted. Placentas forming a pulpy mass enclosing the seeds ..	3. GENIOSTOMA.

1. MITRASACME, Labill.

Herbs, generally of small size. Leaves opposite, entire, usually connected by a transverse stipular line or short sheath. Flowers small, either solitary in the upper axils or in clusters or irregular umbels. Calyx campanulate, 4-partite or rarely 2-partite. Corolla campanulate or salver-shaped; lobes 4, valvate. Stamens 4, affixed to the corolla-tube; filaments usually short; anthers included or rarely exserted. Ovary 2-celled; styles 2, usually connate at first, but separating from the base upwards as the flowering advances; stigma capitate or 2-lobed; ovules numerous in each cell, affixed to peltate placentas. Capsule subglobose or ovoid or compressed, truncate or 2-lobed or almost 2-horned at the tip, opening along the inner margin of the carpels. Seeds numerous, subglobose or compressed; testa smooth, reticulate.

A genus of about 30 species, chiefly Australian, but extending northwards into tropical Asia and southwards to New Zealand.

- Leaves linear-oblong, ending in a stout bristle 1. *M. novæ-zealandiæ*.
 Leaves narrow-obovate, obtuse 2. *M. montana*.

M. Hookeri, *M. Cheesemanii*, and *M. Petriei*, Buch. in Trans. N.Z. Inst. xiv. (1882) 348, 349, are species of *Veronica*, and will be found described under that genus.

1. *M. novæ-zealandiæ*, Hook. f. *Handb. N.Z. Fl.* 737.—A small moss-like densely tufted perfectly glabrous herb, forming rounded patches an inch or two in diameter; branches short, slender, densely compacted. Leaves connate at the base, densely imbricated, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, linear-oblong, suddenly narrowed at the tip into a stout bristle, quite entire, rather coriaceous, concave, nerveless; margins conspicuously thickened. Flowers solitary, terminal, minute, almost concealed by the leaves. Calyx-segments like the leaves. Corolla short and broad; lobes 4, short, obtuse. Stamens 4; filaments very short; anthers broadly oblong, didymous, included. Styles short, free. Capsule oblong, coriaceous, 2-valved at the tip, the valves pointing outwards.

SOUTH ISLAND: Canterbury—Hill's Peak, *Cockayne*! Otago—Dusky Bay, on the mountains, *Hector* and *Buchanan*. STEWART ISLAND: Frazer Peaks, *Rakiahua*, Smith's Lookout, *Kirk*! 800–4500 ft.

Mr. Cockayne's specimens have narrower leaves with shorter bristle-points, and may prove to be a distinct species.

2. *M. montana*, Hook. f. *Fl. Tasm.* i. 274, t. 88 C, var. *Helmsii*, T. Kirk in Trans. N.Z. Inst. xxii. (1890) 445, t. 32.—A small perfectly glabrous perennial herb, forming depressed matted patches 1–3 in. diam. Stems slender, 1–2 in. high; branches weak, straggling. Leaves crowded towards the tips of the branches, opposite, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, obovate or obovate-oblong, narrowed into short flat petioles or rarely sessile, quite entire, glabrous, rather thick and fleshy, veinless, margins flat. Flowers solitary, terminal, sessile, almost concealed by the leaves. Calyx deeply 4-partite; segments equal, lanceolate, acute. Corolla-tube broad; lobes short, acute, not one-half the length of the tube. Anthers nearly sessile on the throat of the corolla, broadly ovate. Ovary ovoid; styles 2, quite free but connivent. Capsule small, compressed, 2-lobed, the outer angles produced into curved beaks.

SOUTH ISLAND: Westland—Paparoa Range, alt. 3000 ft., *R. Helms*!

This appears to differ from the type, which is a native of Tasmania, in the more slender habit, usually petiolate leaves, terminal sessile flowers, and 2-lobed capsule. It will probably prove to be a distinct species.

2. LOGANIA, R. Br.

Herbs or small shrubs. Leaves opposite, entire, usually connected by a transverse raised stipular line or short sheath, rarely with minute setaceous stipules. Flowers small, often unisexual, in terminal or axillary cymes or solitary. Calyx 5-partite. Corolla campanulate or with a cylindrical tube; lobes 5, rarely 4, spreading, imbricate. Stamens 5, rarely 4, inserted on the corolla-tube; filaments filiform; anthers included or exserted. Ovary 2-celled; style simple; stigma capitate or oblong; ovules usually several in each cell. Capsule oblong-ovoid or globose, obtuse or shortly acuminate, septicidally 2-valved, valves 2-fid, at length separating from the placentas. Seeds ovoid or more or less peltate.

Species 18, all confined to Australia except the following one, which is very imperfectly known, and may not belong to the genus. *L. tetragona*, Hook. f. Handb. N.Z. Fl. 188, and *L. ciliolata*, Hook. f. l.c. 737, have been proved to be species of *Veronica*, and are now known as *V. dasyphylla* and *V. Gilliesiana*, Kirk. *L. Armstrongii*, Buch. in Trans. N.Z. Inst. xiv. (1882) 347, t. 28, f. 3, is *Veronica uniflora*, Kirk, which see.

1. *L. depressa*, Hook. f. *Fl. Nov. Zel.* i. 177.—“A prostrate rigid woody shrub; branches densely interlaced, puberulous. Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in. long, coriaceous, veinless, linear-obovate or oblong, obtuse. Flowers minute, axillary, pedicelled, bracteate, solitary or in 3–5-flowered panicles. male only seen. Sepals oblong, obtuse, ciliate. Corolla scarcely longer than the calyx; lobes rounded. Filaments slender; anthers large, 2-cleft for half-way up. Ovary imperfect in my specimens (which are probably unisexual); style short, clavate; stigma oblong, thick. Fruit unknown.”—*Handb. N.Z. Fl.* 188.

“NORTH ISLAND: Ruahine Mountains, Colenso. Very closely allied to the *L. fasciculata*, F. Muell., of the Australian Alps. Habit of an alpine *Coprosma*.”

This is unknown to me, not having been collected since its discovery more than fifty years ago. I have consequently reproduced the description given by Hooker in the Handbook. Mr. N. E. Brown, who at my request has examined the type specimen in the Kew Herbarium, says, “This appears to be a true *Logania*, but the specimen has male flowers only, which have a regular 5-lobed corolla bearded at the throat and 5 stamens alternating with the corolla-lobes, affixed near the base of the corolla-tube; filaments filiform; anthers slightly exserted.”

3. GENIOSTOMA, Forst.

Glabrous shrubs. Leaves opposite, connected by a transverse line or short sheath. Flowers small, in opposite axillary cymes or clusters. Calyx 5-partite; segments acute. Corolla campanulate or almost rotate; lobes 5, spreading, imbricate, usually contorted in the bud. Stamens 5, affixed to the tube or throat of the corolla; filaments short; anthers included or exserted. Ovary 2-celled;

style simple ; stigma capitate or oblong ; ovules numerous in each cell. Capsule globose or oblong, septicidally 2-valved ; valves separating from the consolidated placentas and axis. Seeds numerous, small, enveloped by the persistent placentas.

Species about 20, ranging from Madagascar, Mauritius, and the Malay Archipelago to Australia, the Pacific islands, and New Zealand. The single species found in New Zealand is endemic.

1. *G. ligustrifolium*, *A. Cunn. Precur.* n. 401.—A perfectly glabrous much-branched shrub 4–12 ft. high ; branches slender, terete. Leaves $1\frac{1}{2}$ –3 in. long, ovate or elliptic-ovate, acuminate, shortly petiolate, membranous, quite entire, paler beneath, veins conspicuous. Flowers in short axillary corymbs or fascicles, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., greenish-white ; pedicels bracteolate. Calyx-lobes ovate, acuminate, ciliolate. Corolla rotate-campanulate ; tube short ; lobes spreading or reflexed, bearded within. Ovary subglobose ; style very short ; stigma 2-lobed. Capsule $\frac{1}{2}$ in. diam., subglobose, mucronate, splitting into 2 boat-shaped valves. Seeds numerous ; testa brown, pitted.—*Hook. Ic. Plant.* t. 430 ; *Raoul, Choix*, 44 ; *Hook. f. Fl. Nov. Zel.* i. 177 ; *Handb. N.Z. Fl.* 189. *G. rupestre*, *A. Rich. Fl. Nouv. Zel.* 207 (not of *Forst.*).

Var. *major*, *Cheesem.*—Leaves larger, $2\frac{1}{2}$ –5 in. long.

Var. *crassum*, *Cheesem. in Trans. N.Z. Inst.* xxix. (1897) 392.—Leaves smaller and broader, $\frac{1}{2}$ – $\frac{3}{4}$ in. long by $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, broadly ovate or orbicular-ovate, subacute, rather thick and fleshy when fresh.

NORTH ISLAND : Abundant in lowland situations from the North Cape to Cook Strait. SOUTH ISLAND : Marlborough, *Buchanan*. *Hangehange*. September–November. Var. *major* : Three Kings Islands, abundant, *T. F. C.* Var. *crassum* : Cliffs near the North Cape, rare, *T. F. C.*

ORDER L. GENTIANEÆ.

Annual or perennial herbs, rarely shrubs, usually glabrous and bitter. Leaves opposite, rarely alternate or whorled, nearly always simple and entire ; stipules wanting. Flowers regular, hermaphrodite, solitary or cymose. Calyx inferior, 4–5-lobed or -partite, lobes imbricate. Corolla gamopetalous, hypogynous, 4–5-lobed or -partite, lobes twisted to the right (valvate in *Liparophyllum*). Stamens 4–5, inserted on the throat or tube of the corolla and alternate with its lobes ; filaments filiform or dilated at the base ; anthers 2-celled, introrse. Ovary superior, 1-celled, or 2-celled by the meeting of 2 intruded parietal placentas ; style single, short or long ; stigma entire or 2-lobed or 2-lamellate ; ovules numerous in each cell. Fruit a 1- or 2-celled capsule with septicidal dehiscence, rarely fleshy or indehiscent. Seeds numerous, small ; albumen copious, fleshy ; embryo minute.

A large and very natural order, found nearly all over the world, but most abundant in the mountainous regions of the Northern Hemisphere. Genera about 50; species estimated at 500, almost without exception possessing bitter and tonic properties. The yellow gentian (*Gentiana lutea*) produces gentian-root, one of the earliest-known medicines, and still frequently used. Other species of *Gentiana* and of the allied genera *Erythraea*, *Chlora*, *Frasera*, *Sabbatia*, &c., have very similar qualities. Of the 3 genera found in New Zealand, *Gentiana* has the range of the whole order; *Sebæa* occurs in Australia, eastern Asia, and South Africa; while *Liparophyllum* is confined to Tasmania and New Zealand.

* Leaves opposite. Corolla-lobes contorted in bud.

Flowers small. Corolla cylindric; lobes spreading.

Ovary 2-celled. Style deciduous 1. SEBÆA.

Flowers large. Corolla campanulate or rotate. Ovary

1-celled. Style persistent 2. GENTIANA.

** Leaves alternate or tufted. Corolla-lobes induplicate-valvate.

Small herb with linear tufted leaves. Fruit fleshy .. 3. LIPAROPHYLLUM.

1. SEBÆA, R. Br.

Erect glabrous annual herbs. Leaves small, opposite, sessile. Flowers small, yellow, in terminal dichotomous cymes. Calyx 4-5-partite; segments often keeled or winged. Corolla-tube cylindric; lobes 4-5, spreading, contorted in the bud. Stamens 4-5, affixed to the throat or tube of the corolla; filaments short; anthers oblong, introrse, straight or recurved at the tips. Ovary completely 2-celled, placentas large, adnate to the septum; style filiform; stigma clavate or capitate. Capsule globose or ovoid, septically 2-valved. Seeds numerous, minute; testa reticulated.

A genus comprising about 20 species, found in tropical and southern Africa, Madagascar, the Himalayas, Australia, and New Zealand. The single New Zealand species is also Australian.

1. *S. ovata*, R. Br. *Prodr.* 452. — A simple or sparingly branched annual herb 4-8 in. high; stems 4-angled. Leaves few, in distant pairs, sessile, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, broadly ovate or orbicular-ovate, obtuse or subacute. Flowers small, $\frac{1}{4}$ in. long, pale-yellow, in a terminal dichotomous cyme, with a flower in each axil. Calyx-segments 5, ovate-lanceolate, acute, keeled. Corolla with a long straight tube and 5 short lobes which are twisted after flowering. Anthers linear-oblong, with a gland at the tip. Style short. Capsule oblong.—*Hook. f. Fl. Nov. Zel.* i. 179; *Handb. N.Z. Fl.* 191; *Benth. Fl. Austral.* iv. 371. *S. gracilis*, A. Cunn. *Precur.* n. 400; *Raoul, Choix*, 44.

NORTH ISLAND: Bogs at Mangamuka, Hokianga, R. Cunningham; Hawke's Bay, Colenso! Hamilton! Tryon! SOUTH ISLAND: Canterbury—Near Christchurch, Armstrong; Port Cooper, Lyall; Lake Ellesmere and other localities on the Canterbury Plains, Kirk! Otago—Buchanan! Apparently a rare and local plant in New Zealand, but common in many parts of Australia.

2. GENTIANA, Linn.

Annual or perennial herbs. Leaves opposite. Flowers axillary and terminal, solitary or cymose, usually conspicuous. Calyx tubular or cup-shaped, 5- or rarely 4-lobed. Corolla subrotate or campanulate or tubular or funnel-shaped; lobes 5-4, in species not found in New Zealand often with folds between the lobes. Stamens 5-4, inserted on the corolla-tube, included; anthers oblong or ovate. Ovary 1-celled, with 2 parietal placentas; style short or almost wanting; stigmas 2, persistent, recurved; ovules numerous. Capsule stalked or sessile, ellipsoid to narrow-oblong, 2-valved to the base. Seeds small, globose or oblong.

A large and beautiful genus, probably including not far from 250 well-ascertained species. It is most abundant in the temperate and alpine regions of the Northern Hemisphere, extends along the chain of the Andes throughout South America, is sparingly found in Australia and Tasmania, and is plentiful in New Zealand, except in the northern half of the North Island. The species are in all countries highly variable and difficult of discrimination, but nowhere more so than in New Zealand, where they are peculiarly unstable, presenting a bewildering multitude of closely allied forms, to arrange which systematically is a most perplexing task. The late Baron Mueller solved all difficulties by uniting the whole of the Australian and New Zealand species, together with several from South America, under Forster's *G. saxosa*; but this extreme view has not received the sanction of any other botanist of repute, and is entirely repudiated by New Zealand workers. Since the publication of the Handbook the only attempt that has been made to deal with the New Zealand forms as a whole is Mr. Kirk's "Revision" (Transactions N.Z. Inst. xxvii. 330), in which 10 species are admitted. In the following arrangement I have increased this number to 16, in several cases unwillingly, but there is really little choice between giving the rank of species to a considerable number of closely allied forms or of reducing the whole of them to two or three comprehensive aggregates. In the latter case it would be necessary to distinguish the forms as varieties, which is practically the same arrangement under a different name. Owing to their extreme variability, the student will find it difficult to identify the species until he has collected a large series of specimens from widely separated localities, and has thus become acquainted with the range and trend of variation. I have to acknowledge the valued aid afforded by Mr. N. E. Brown, who has kindly compared many of my specimens with those at Kew and in the British Museum Herbarium.

A. Annual, dwarf, 1-3 in. high. Flowers solitary at the tips of the branches. Calyx-lobes broadly ovate.

Stems simple or sparingly branched. Leaves mostly cauline, $\frac{1}{8}$ - $\frac{1}{3}$ in. long. Flowers $\frac{1}{3}$ in. diam. 1. *G. filipes*.

B. Perennial, dwarf, 1-4 in. high. Flowers solitary, terminating naked scapes. Calyx-lobes linear-subulate.

Stems densely tufted. Leaves all radical, narrow-linear, $\frac{1}{3}$ - $\frac{2}{3}$ in. Flowers $\frac{1}{2}$ in. diam. 2. *G. lineata*.

C. Annual, slender, 3-14 in. high. Leaves mostly cauline. Flowers $\frac{1}{3}$ - $\frac{1}{2}$ in. diam. Calyx-lobes linear-subulate.

Stems weak, sparingly branched. Leaves oblong-spathulate, thin 3. *G. Grisebachii*.

D. Perennial, rarely annual, erect. Radical leaves usually rosulate, crowded; cauline few, in distant pairs, sessile. Flowers large, $\frac{3}{4}$ in. diam. or more, in terminal cymes or umbels, rarely solitary.

- Annual. Flowering stems 6-12 in., sometimes with decumbent branches from the base. Radical leaves $\frac{1}{2}$ -1 $\frac{1}{4}$ in., ovate or broadly oblong, membranous. Flowers rather small, in involucrate umbels 4. *G. chathamica*.
- Usually perennial. Flowering stems single or more rarely branched from the base, stout, erect, 6-20 in. Leaves yellow-green when drv; radical 1-4 in., linear- or oblong-spathulate; cauline 1-2 distant pairs, linear-oblong. Calyx short 5. *G. corymbifera*.
- Perennial. Flowering stems usually single, very slender, 6-20 in. Leaves black when dry; radical $\frac{1}{2}$ -1 in., ovate-lanceolate; cauline 2-5 remote pairs 6. *G. Townsoni*.
- Flowering stems usually single, often tall and stout, 10-24 in. Radical leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., obovate-spathulate; cauline broadly ovate, often cordate at the base 7. *G. montana*.
- Flowering stems one or several, often decumbent below, 5-20 in. Radical leaves 1-3 in., oblong-spathulate, cauline 1-5 opposite pairs. Flowers in lax corymbose cymes or umbels 8. *G. patula*.
- Flowering stems several, short. 1-6 in. Radical leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., spathulate or linear-spathulate. Flowers in 2-6-flowered cymes or solitary 9. *G. bellidifolia*.
- Flowering stems excessively branched from the base, often forming rounded masses 2-6 in. diam. Radical leaves 1-3 in., oblong- or obovate-spathulate. Flowers in dense corymbose cymes 10. *G. divisa*.

E. Annual, erect. Radical leaves numerous, rosulate, obovate-spathulate; cauline few, petiolate. Flowers in 2-5-flowered involucrate umbels.

- Flowering stems several, 4-10 in. Flowers small, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam. Calyx equalling the corolla or nearly so 11. *G. Spenceri*.

F. Prostrate or decumbent or suberect, leafy. Leaves spathulate; cauline numerous, petiolate. Flowers in few-flowered cymes or clustered at the ends of the branches.

- Perennial, prostrate at the base. Leaves $\frac{3}{4}$ -1 $\frac{3}{4}$ in., linear-spathulate, long-petioled. Calyx much shorter than the corolla; lobes recurved at the tip 12. *G. saxosa*.
- Perennial, prostrate at the base, 4-14 in. Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., obovate-spathulate, fleshy, shining. Calyx almost equalling the corolla; lobes not recurved 13. *G. cerina*.
- Annual, ascending or erect, 1-4 in. Leaves $\frac{1}{2}$ -1 in., linear-oblong. Calyx almost equalling the corolla 14. *G. concinna*.

G. Stout, erect, 3-10 in. high, fastigately branched, densely leafy. Flowers small, $\frac{1}{3}$ in. long, almost hidden by the cauline leaves and bracts.

- Annual. Radical leaves 1-2 in., oblong or oblong-spathulate 15. *G. antarctica*.
- Perennial. Radical leaves $\frac{3}{4}$ -1 $\frac{1}{4}$ in., lingulate or linear-spathulate 16. *G. antipoda*.

1. **G. filipes**, *Cheesem. in Trans. N.Z. Inst.* xxviii. (1896) 536.—A small annual herb 1–3 in. high; stems slender, erect, simple or branched from the base, sparingly leafy. Leaves mostly cauline, few, small, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, oblong- or obovate-spathulate, obtuse or subacute, sessile or the lower ones narrowed into short flat petioles. Flowers solitary, terminating the branches, large for the size of the plant, $\frac{1}{3}$ in. diam., white. Calyx broad, tube $\frac{1}{8}$ in. long; lobes $\frac{1}{3}$ in., broadly ovate, acute. Corolla subrotate, divided about $\frac{1}{2}$ -way down; lobes ovate, subacute. Stamens more than $\frac{1}{2}$ as long as the corolla; anthers oblong. Ovary linear-obovoid.

SOUTH ISLAND: Nelson—Slopes of Mount Arthur, 4000–5000 ft., *T. F. C.* January.

2. **G. lineata**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 334, t. 27.—A small densely tufted perennial herb 2–4 in. high, often forming a compact sward; rootstock branched above. Leaves all radical or crowded on very short branches, erect, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{25}$ – $\frac{1}{15}$ in. broad, linear or narrow linear-spathulate, acute or obtuse, gradually narrowed into a slender flat petiole, sheathing at the base. Scapes 1–3 in. long, slender, wiry, erect, naked or with 1 or 2 pairs of linear leaves at the very base. Flower solitary, $\frac{1}{2}$ – $\frac{2}{3}$ in. long. Calyx-tube $\frac{1}{10}$ in. long; lobes $\frac{3}{10}$ in., linear-subulate, tapering to an acute or almost acuminate tip. Corolla narrow-campanulate, cut down $\frac{2}{3}$ of the way to the base into 5 ovate acute lobes. Stamens $\frac{2}{3}$ as long as the corolla.

SOUTH ISLAND: Otago—Crest of the Longwood Range, *Kirk!* Blue Mountains, *Petrie!* STEWART ISLAND: Exact locality not stated, *Petrie!* Sea-level to 3500 ft. January–March.

A curious little plant, easily recognised by the peculiar habit, very narrow leaves, and naked scapes bearing a rather large solitary flower.

3. **G. Grisebachii**, *Hook. f. in Hook. Ic. Plant.* t. 636.—A slender much or sparingly branched annual herb; root weak, often filiform; stems branching from the base, very slender, decumbent or suberect, 3–14 in. long, rarely more. Lower leaves narrowed into slender petioles as long or longer than the blade, $\frac{1}{2}$ –1 in. long, spathulate or oblong-spathulate, rather thin and membranous, obtuse; cauline usually smaller, remote, sessile or shortly petiolate, oblong or ovate-oblong, obtuse or subacute. Flowers few or many, terminal and solitary at the tips of the branches, rather small, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, white. Calyx divided $\frac{3}{4}$ -way down or more, often somewhat angled at the base; lobes linear or linear-subulate, acuminate, midrib distinct. Corolla narrow-campanulate, divided more than $\frac{1}{2}$ -way down; lobes narrow-ovate or oblong, acute. Stamens about two-thirds the length of the corolla. Ovary linear-oblong, often shortly stipitate.—*G. montana*, *Hook. f. Fl. Nov. Zel.* i. 178; *Handb. N.Z. Fl.* 190 (not of *Forst.*).

Var. *novæ-zealandiæ*.—Smaller and more slender, 1-5 in. high. Leaves $\frac{1}{2}$ – $\frac{1}{2}$ in. long, oblong- or ovate-spathulate. Flowers smaller. *G. novæ-zealandiæ*, *Armstr. in Trans. N.Z. Inst.* iv. (1872) 290.

NORTH ISLAND: Base of Tongariro, *Bidwill*; Ruapehu, *H. Hill*! Kaimanawa Mountains, *Tryon*! Ruahine Range, *Colenso*! *Tryon*! Mount Egmont, *Petrie*! Tararua Mountains, *Buchanan*! SOUTH ISLAND, STEWART ISLAND: In various localities from Nelson southwards, but often local. Sea-level to 3500 ft. December–February.

This was reduced to Forster's *G. montana* by Sir J. D. Hooker; but Mr. N. E. Brown, who has recently done me the service of examining Forster's types preserved in the British Museum and at Kew, informs me that it is quite distinct, and in no way resembles *G. montana*. It may be recognised by the usually much-branched slender and wiry sparingly leafy stems, small rather thin leaves, small flowers terminal and solitary on the branches, and linear-subulate calyx-lobes.

4. *G. chathamica*, *Cheesem. n. sp.*—Annual, 6-12 in. high; main stem stout or slender, erect, with or without several shorter and weaker branches springing from the base and usually decumbent below. Radical leaves variable in size, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, narrowed into short petioles or almost sessile, ovate-spathulate or oblong-spathulate to broadly oblong, obtuse, rather thin; cauline 1 or 2 pairs, ovate or oblong, sessile with a broad often almost cordate base. Flowers small, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, white, sometimes veined with pink, arranged in several 3-12-flowered umbels terminating the stem and its branches, each umbel with an involucre of 3-5 whorled bracts; pedicels usually longer than the bracts. Calyx about three-quarters the length of the corolla, divided about three-quarters way down; lobes linear-oblong, obtuse. Corolla narrow-campanulate, divided two-thirds way down; lobes oblong or oblong-obovate, rounded at the tip. Ovary linear-oblong, sessile.—*G. pleurogynoides* var. *umbellata*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 335.

CHATHAM ISLANDS: Abundant in wet places, *Travers*! *Miss Seddon*! *Cox* and *Cockayne*!

I consider this to be a very distinct species, to be recognised without any difficulty by the peculiar habit, small and broad thin leaves, and small umbellate flowers, with a deeply divided calyx and corolla. A specimen collected by Mr. Buchanan at the Lindis Pass, Otago, and another gathered by Mr. H. B. Kirk on D'Urville Island may belong to the same species, but they are far more copiously branched and have much longer leaves, and are best held over until more complete material is obtained.

5. *G. corymbifera*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 336.—Usually perennial, but often dying after flowering. Root stout, long and tapering. Stems simple or rarely branched from the base, stout, erect, terete, 6-20 in. high. Radical leaves numerous, rosulate, 1-4 in. long, $\frac{1}{4}$ – $\frac{3}{4}$ in. broad, narrow oblong-spathulate or lanceolate-spathulate, obtuse or acute, narrowed into a short or long petiole, blade often channelled above, 1-3-nerved, coriaceous.—Fl.

ceous, rather thick and fleshy when fresh. Cauline leaves one or two pairs, seldom more, $\frac{3}{4}$ –2 in. long, linear-lanceolate or linear-oblong, sessile. Flowers large, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., white, in large compact terminal umbels or cymes 2–6 in. diam. or more; pedicels slender. Calyx short, often less than one-half the length of the corolla, campanulate, divided from $\frac{1}{3}$ to $\frac{1}{2}$ way down, rarely more; lobes lanceolate-deltoid, acute or acuminate. Corolla divided about two-thirds way down; lobes broadly oblong, rounded at the tip. Ovary stipitate.—*G. saxosa* var. *y*, *Hook. f. Handb. N.Z. Fl.* 191. *G. pleurogynoides* var. *rigida*, *Kirk. in Trans. N.Z. Inst.* xxvii. (1895) 335.

SOUTH ISLAND: Mountain districts from Nelson to Otago, abundant. 1000–4000 ft. January–March.

A very handsome plant, in its ordinary state well distinguished by the stout usually simple and almost naked stems, long and narrow crowded rosulate radical leaves, and dense cymes or umbels of large white flowers, the calyx of which is broad and short, with lanceolate-deltoid acute lobes. Mr. Brown informs me that it corresponds with the *G. saxosa* var. *y* of the Handbook, and I suspect that it also includes a part of the *G. pleurogynoides* of the same work. At any rate, it is the plant which New Zealand botanists have been accustomed to call *G. pleurogynoides*. The true *G. pleurogynoides* was founded on Tasmanian specimens, and has not yet been satisfactorily matched with any New Zealand plant.

6. *G. Townsoni*, *Cheesem. n. sp.*—Perennial; root slender, woody, often branched at the top. Flowering stems usually single, rarely 2 or 3 from the root or branched from the base, erect, slender, wiry, 6–20 in. high. Leaves almost black when dry; radical very numerous, crowded at the base of the stem, spreading or ascending, small for the size of the plant, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{6}$ – $\frac{1}{3}$ in. broad, ovate-lanceolate or trowel-shaped to linear-lanceolate, narrowed into a rather slender petiole, coriaceous or almost fleshy, subacute or obtuse. Cauline leaves in 2–5 remote pairs, ascending, lanceolate or oblong-lanceolate, sessile, subacute. Flowers white, large, $\frac{3}{4}$ in. diam. or more, in 5–12-flowered terminal cymes or umbels; pedicels slender; bracts usually whorled. Calyx about half the length of the corolla, cut about three-quarters way down; lobes lanceolate, acute. Corolla deeply divided; lobes broadly oblong, rounded at the tip.—*G. saxosa* var. *pleurogynoides*, *Hook. f. Fl. Nov. Zel.* i. 178, *in part*. *G. pleurogynoides*, *Hook. f. Handb. N.Z. Fl.* 190, *in part* (not of Griseb.).

SOUTH ISLAND: Nelson—*Bidwill* (n. 67 in *Herb. Kew*, *fide* N. E. Brown); coast ranges near Westport, Mount Frederic, Mount Rochfort, Mount Buckland, &c., *Townson*! Sounds of the south-west coast of Otago, *Lyall* (*fide* N. E. Brown). 1000–4000 ft. January–March.

A very beautiful plant, easily recognised by the tall slender strict stems, small uniform crowded leaves, which are almost black when dry, remote ascending cauline leaves, and rather dense umbels of large flowers. I have seen no specimens but Mr. Townson's, from which the above description is drawn up;

but Mr. Brown informs me that specimens collected by Bidwill and Lyall are in the Kew Herbarium, and that together with another form with long leaves it makes up the principal part of the *G. pleurogynoides* of the Handbook (but not of Grisebach). This long-leaved plant Mr. Brown is inclined to unite with *G. Townsoni*, but for the present I have placed it in my *G. patula*.

7. *G. montana*, Forst. Prodr. n. 133.—Perennial; rootstock stout and woody, often branched at the top. Flowering stems one or several, simple, terete, very tall and stout, 10–24 in. high. Radical leaves usually very numerous, densely crowded, spreading, $\frac{3}{4}$ –1½ in. long, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad, broadly obovate-spathulate, rounded at the tip or subacute, gradually narrowed into a broad flat petiole, 3–5-nerved, coriaceous, rather thick and fleshy when fresh. Cauline leaves in 2–6 opposite pairs, sessile, broadly ovate or oblong, 3–5-nerved or in large specimens 7-nerved, acute or subacute, often cordate at the base. Flowers very large, white, often $\frac{3}{4}$ –1 in. diam., in broad many-flowered umbels or cymes 2–4 in. across; pedicels long, slender; bracts broad, usually whorled. Calyx from one-half to nearly two-thirds the length of the corolla, cut three-quarters way down; lobes lanceolate, acute. Corolla deeply divided; lobes broadly oblong or obovate, rounded at the tip.—*A. Rich. Fl. Nouv. Zel.* 203; *A. Cunn. Precur.* n. 399 (but not of Hook. f. *Fl. Nov. Zel.* i. 178, nor of *Handb. N.Z. Fl.* 190).

Var. *stolonifera*.—Much more slender, 8–16 in. high; stem with long creeping stolons at the base. Radical leaves 1–3 in. long, oblong or elliptical-spathulate, rather thin; petiole more slender, as long as the blade. Flowers fewer, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., white with purple streaks.

SOUTH ISLAND: Nelson—Mount Frederic, Mount Rochfort, Mount Buckland, and other peaks on the coast ranges near Westport, abundant, *W. Townson!* Otago—Dusky Sound, *Forster, Anderson, Lyall.* 2000–4000 ft. January–March.

At the time of the publication of the Flora and Handbook there was no authentic specimen of *G. montana* at Kew, and Forster's original diagnosis is so short and scanty that the position of the species was quite conjectural. Hooker applied the name to the slender annual plant with linear-subulate calyx-lobes originally described by him in the "Icones Plantarum" as *G. Grisebachii*, and for many years this determination was acquiesced in by New Zealand botanists. But a set of Forster's plants now exists at Kew, and another in the British Museum Herbarium. Mr. N. E. Brown, who has critically examined for me the New Zealand Gentians preserved in both collections, informs me that Forster's types of *G. montana* represent an altogether different plant to *G. Grisebachii*, but that they agree with specimens collected in Dusky Sound by Anderson during Cook's third voyage, and subsequently in the same locality by Lyall. I am indebted to Mr. Brown for tracings of Forster's two specimens, which appear to be the only ones extant in England, and also of three of Lyall's. Forster's are far from good; but Lyall's correspond so closely with a plant collected on the coast ranges near Westport by Townson that I can hardly doubt their being identical, although the Westport specimens are rather larger and stouter. Both agree in the numerous crowded obovate-spathulate radical leaves, and the short and broad cauline leaves, which are sessile and cordate at the base, and the inflorescence is practically the same. And both agree fairly well with the description given in A. Richard's "Flore de la

Nouvelle Zélande," which is professedly taken from Forster's manuscripts. Probably the species will be found in suitable localities along the whole of the western coast, from the Karamea River and Westport to Dusky Sound.

8. *G. patula*, *Cheesem. n. sp.*— Usually perennial; root stout or slender. Stems one or several from the root, often decumbent at the base, erect above, simple or branched, 5–20 in. high. Radical leaves usually numerous, 1–3 in. long, oblong-spathulate or lanceolate-spathulate, rarely broader and ovate-spathulate, acute or obtuse, coriaceous or slightly membranous. Cauline leaves in 1–5 opposite pairs, oblong or linear-oblong or lanceolate, sessile. Flowers large, $\frac{3}{4}$ –1 in. diam., white, in few- or many-flowered terminal umbels or corymbose cymes. Calyx divided nearly three-quarters way down; lobes linear-oblong, acute or obtuse. Corolla deeply divided; lobes oblong or broadly oblong, rounded at the tip.— *G. saxosa* var. b, *Hook. f. Handb. N.Z. Fl.* 191. *G. bellidifolia* var. *patula*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 336.

NORTH ISLAND: Tararua Range, *Townson!* SOUTH ISLAND: Abundant in mountain districts throughout. 1000–4000 ft. January–March.

I have much hesitation in advancing this as a distinct species. What may be regarded as the typical state has a stout fusiform root often shortly branched at the top, each branch bearing a crown of oblong-spathulate radical leaves and a flowering stem 6–18 in. high. Dwarf specimens are undistinguishable from *G. bellidifolia*; but usually the stems are much taller, giving the plant quite a different appearance, and the flowers are much more numerous. Other states approach *G. montana*, *G. corymbifera*, and *G. Townsoni*; and small copiously branched forms appear to pass into *G. divisa*.

9. *G. bellidifolia*, *Hook. f. in Hook. Ic. Plant.* t. 635.— Perennial; variable in size and habit, the typical form with a stout fusiform root crowned with numerous short densely compacted stems, the flowering ones few or many, 1–6 in. high. Radical leaves numerous, crowded, rosulate, $\frac{1}{2}$ –1½ in. long, spathulate or linear-spathulate, obtuse, narrowed into a short petiole, coriaceous or fleshy, nerves usually indistinct. Cauline leaves few, distant, linear-oblong to linear-obovate, obtuse, sessile, often recurved. Flowers large, white, $\frac{2}{3}$ –¾ in. diam. or even more, terminal, solitary or in 2–6-flowered cymes. Calyx one-half the length of the corolla or shorter; lobes linear-oblong to elliptic-ovate, subacute. Corolla divided three-quarters way down; lobes obovate-oblong, rounded at the tip. Ovary shortly stipitate.— *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 336. *G. saxosa* var. a, *Hook. f. Handb. N.Z. Fl.* 191 (not of Forst.).

NORTH AND SOUTH ISLANDS: Not uncommon in mountain districts from the East Cape, Taupo, and Mount Egmont to Foveaux Strait. 1500–5500 ft. January–March.

A beautiful little plant. The plate in the "Icones Plantarum" represents a somewhat small state, with solitary flowers, but it is otherwise an excellent representation of the species. It appears to pass gradually into both *G. patula* and *G. divisa*.

10. *G. divisa*, *Cheesem. n. sp.*—Stems slender, erect, excessively branched from the base, often forming hemispherical masses 2–6 in. diam. Radical leaves very numerous, rosulate, 1–3 in. long, oblong- or obovate-spathulate, rounded at the tip, gradually narrowed into broad flat petioles, usually rather thin and membranous, 3–5-nerved. Cauline leaves similar but smaller and on shorter petioles or the uppermost sessile. Flowers very numerous, in dense or lax corymbose cymes, sometimes almost concealing the leaves, about $\frac{3}{4}$ in. diam., white. Calyx rather more than one-half the length of the corolla, divided three-quarters of the way down or more; lobes linear-oblong, obtuse or subacute. Corolla deeply divided; lobes oblong, rounded at the tip.—*G. bellidioides*, *var. divisa* and *var. vacillata*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 337.

Var. magnifica.—Forming compact globose masses 3–9 in. diam., so densely covered with flowers as to resemble large snow-balls. Radical leaves much more coriaceous than in the type. Flowers large, $\frac{3}{4}$ –1 in. diam. Calyx three-quarters the length of the corolla. Corolla-lobes broadly oblong, rounded.—*G. bellidioides var. magnifica*, *Kirk, l.c.*

SOUTH ISLAND: In various localities in mountain districts from Nelson to Otago, but not common. 500–3500 ft. *Var. magnifica*: Slopes of Mount Captain, Nelson, alt. 4500 ft., *Kirk!*

This is so distinct in habit from all the forms of *G. bellidifolia* and *G. patula* that I feel compelled to grant specific rank to it.

11. *G. Spencersi*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 335.—Annual; stems few or many from the root, slender, erect, 4–10 in. high. Radical leaves numerous, rosulate, 1–2 in. long, broadly ovate- or obovate-spathulate, rounded at the tip, narrowed into a broad petiole as long or longer than the blade, 3- or rarely 5-nerved; cauline few, rather narrower and with shorter petioles. Flowers $\frac{1}{3}$ – $\frac{1}{2}$ in. long, white or white streaked with purple veins, in dense 5–12-flowered umbels, each stem usually with a terminal umbel and 2 lateral ones springing from a pair of leaves half-way down; umbels surrounded by a whorl of 5–7 oblong-spathulate leaves overtopping the flowers and forming a kind of involucre; pedicels short. Calyx cut down almost to the base; lobes linear, acute. Corolla hardly longer than the calyx, divided about $\frac{2}{3}$ -way down; lobes linear-oblong, obtuse.

SOUTH ISLAND: Nelson—Cobb Valley (near Mount Peel), *F. G. Gibbs!* mountains near Westport *Rev. F. H. Spencer! Townson!* Mount Frederic, Mount Buckland, *Townson!* 1500–3500 ft. January–February.

I am indebted to Mr. Townson for excellent specimens of this, which appears to be a perfectly distinct species, at once recognised by the involucre umbels and small flowers, the corolla of which is hardly longer than the calyx. There is usually only one pair of cauline leaves besides those forming the involucre.

12. **G. saxosa**, *Forst. in Act. Holm.* (1777) 183, t. 5.—Perennial. Stems stout, usually much branched, prostrate or decumbent below, ascending or suberect at the tips, 3–6 in. long. Radical leaves numerous, crowded, spreading, $\frac{3}{4}$ – $1\frac{3}{4}$ in. long, spathulate or linear-spathulate, obtuse, narrowed into slender petioles as long or longer than the blade, fleshy, nerveless; cauline similar but smaller and on shorter petioles, close together or distant. Flowers terminal, solitary or in 2–5-flowered cymes at the tips of the branches, large, white, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Calyx small, broad, about $\frac{1}{3}$ as long as the corolla, divided nearly $\frac{3}{4}$ -way down; lobes linear or linear-ligulate, obtuse or subacute, recurved at the tips. Corolla often nearly $\frac{3}{4}$ in. diam., broadly campanulate or subrotate, divided rather more than $\frac{1}{2}$ -way down; lobes oblong, obtuse.—*Prodr.* n. 132; *A. Rich. Fl. Nouv. Zel.* 202; *A. Cunn. Precur.* n. 398; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 178, and *Handb. N.Z. Fl.* 190 (in part); *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 338. *G. saxosa* var. *recurvata*, *Kirk in Trans. N.Z. Inst.* xvii. (1885) 224. *G. Hookeri*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 340, in part (not of Grisebach).

SOUTH ISLAND: Nelson—Coast near Charleston, *Townson!* Westland—Near Hokitika, *Helms!* Otago—Dusky Sound, on rocks washed by the sea, *Forster, Menzies!* Bluff Hill, *Capt. F. W. Hutton!* *Kirk!* *Cockayne!* Colac Bay and Fortrose, *B. C. Aston!* Catlin's River, *Petrie!* islands in Foveaux Strait, *Kirk!* STEWART ISLAND: The Neck, *Petrie!* various stations on the coast, *Kirk!* Sea-level to 800 ft. January–April.

Purely littoral, and confined to rocky shores or sand-hills exposed to salt spray. Its distinguishing characters lie in the usually prostrate or decumbent habit, rather fleshy long-petioled leaves, short and broad deeply divided calyx, with the lobes recurved at the tips. In the Handbook it is merged with *G. bellidifolia* and other mountain species, with which it does not seem to have any very close affinity, its nearest ally, as Mr. Kirk has pointed out, being undoubtedly *G. cerina*.

13. **G. cerina**, *Hook. f. Fl. Antarct.* i. 54, t. 36.—Perennial. Stems usually numerous, much branched, stout, prostrate or decumbent at the base, ascending or suberect at the tips, leafy throughout or naked below, 4–14 in. long. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, obovate-spathulate or oblong-spathulate, obtuse, narrowed into a broad flat petiole, thick and coriaceous or fleshy, smooth and shining, 3-nerved; cauline similar but smaller and with shorter petioles. Flowers on slender pedicels or almost sessile, crowded towards the ends of the branches, sometimes corymbose, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, white or white streaked with red and purple. Calyx about $\frac{1}{5}$ shorter than the corolla or almost equalling it, divided $\frac{3}{4}$ -way down; lobes oblong or oblong-spathulate, obtuse, sometimes slightly recurved at the tip. Corolla broadly rotate-campanulate; lobes oblong, obtuse.—*Handb. N.Z. Fl.* 191; *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 338. *G. Campbellii*, *Homb. et Jacq. Voy. au Pole Sud*, 22, t. 31c.

Var. **suberecta**, *Kirk, l.c.* 339.—Stems more slender, suberect, decumbent at the base, 6–18 in. high. Cauline leaves more remote. Flowers in rather lax corymbs, usually on long pedicels. Calyx-lobes broadly oblong.

AUCKLAND ISLANDS: Not uncommon from sea-level to nearly 1000 ft., *Hooker! Kirk! Chapman!*

A remarkably brilliant plant, well figured in the “*Flora Antarctica*.”

14. **G. concinna**, *Hook. f. Fl. Antarct. i.* 53, t. 35.—Usually annual. Stems short, slender, much branched from the base, erect or ascending, 1–4 in. high; branches crowded, leafy. Leaves close-set, $\frac{1}{3}$ –1 in. long, oblong-spathulate or linear-oblong, obtuse, gradually narrowed into a broad flat petiole, spreading or recurved, coriaceous; cauline similar but smaller. Flowers in the axils of the upper leaves, often very numerous, sessile or shortly peduncled, about $\frac{1}{3}$ in. long, white streaked with red or purple or altogether red. Calyx $\frac{1}{3}$ shorter than the corolla, divided $\frac{3}{4}$ -way down; lobes linear-oblong, obtuse. Corolla rotate-campanulate; lobes obovate-oblong, obtuse.—*Handb. N.Z. Fl.* 190. *G. cerina* var. *concinna*, *Kirk in Trans. N.Z. Inst.* xxvii. (1895) 339.

AUCKLAND ISLANDS: Not uncommon, *Hooker, Kirk! Chapman!*

A charming little plant, very closely allied to *G. cerina*, from which it is mainly separated by being annual, by the more erect mode of growth, and by the smaller size of all its parts. According to Mr. Kirk, it is usually found growing on the surface of the huge masses of *Trichocolea tomentella* and other *Hepaticæ* which often carpet the ground in sheltered places in the Auckland Islands.

15. **G. antarctica**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 339.—Annual; whole plant very minutely verrucose. Stems stout, erect, simple or branched, densely leafy throughout, 3–10 in. high. Radical leaves numerous, spreading all round, 1–2 in. long; blade oblong or lanceolate, obtuse, 3–5-nerved, membranous when dry, narrowed into a petiole of about equal length; cauline leaves rather smaller, with shorter petioles. Flowers small, about $\frac{1}{3}$ in. long, crowded on short axillary leafy branchlets shorter than the subtending leaves, each flower in the axil of a floral leaf exceeding it in length; pedicels short, slender. Calyx equalling the corolla or nearly so, divided almost to the base; lobes linear or ligulate, obtuse. Corolla divided about $\frac{2}{3}$ -way down; lobes linear-oblong, obtuse or subacute. Ovary minutely verrucose.—*G. concinna* var. *robusta*, *Hook. f. Fl. Antarct. i.* 53.

Var. **imbricata**, *Kirk, l.c.* 340.—Rigid, erect, 1–3 in. high. Leaves smaller, closely imbricating, ovate or ovate-spathulate, not verrucose, coriaceous, margins thickened. Flowers solitary in the axils of the upper leaves; corolla longer than the calyx.

CAMPBELL ISLAND: *Hooker, Kirk!*

Apparently a very distinct species. Mr. Kirk remarks that it is easily recognised by the pale greenish colour, the minutely verrucose surface of all its

parts, and the slender excessively branched inflorescence, the flowers being almost hidden amongst the crowded leaves and bracts. It is sometimes reduced to a broad rosette of leaves with a short spike-like cluster of densely crowded flowers.

16. *G. antipoda*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 340.—Perennial; whole plant very minutely verrucose. Stems numerous, stout, decumbent below, erect above, 3–10 in. high. Leaves $\frac{3}{4}$ –1 $\frac{1}{2}$ in. long, linear-spathulate or lingulate, obtuse, narrowed into a rather long flat petiole; lower crowded, often spreading or recurved; upper more remote, smaller and with shorter petioles, ascending or erect. Flowers small, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, white or white streaked with red, usually numerous on slender erect axillary branchlets, each flower in the axil of a linear bract, but sometimes the flowers are solitary in the axils of the cauline leaves. Calyx slightly shorter than the corolla, divided almost to the base; lobes linear-lanceolate, acute. Corolla very thin, divided about $\frac{2}{3}$ -way down; lobes linear-oblong.

ANTIPODES ISLAND: Abundant, *Kirk*!

Perhaps too close to the preceding, from which it mainly differs in the more numerous stems and narrower lingulate leaves. Mr. Kirk distinguished two forms, one with yellowish stems and white flowers, the other with reddish stems and flowers streaked with red.

It should be remarked that both this species and *G. antarctica* occasionally produce much smaller flowers which have smaller almost sessile anthers and ovaries with fewer ovules. Probably these flowers are cleistogamic, but my specimens are not sufficiently good to determine this.

3. *LIPAROPHYLLUM*, Hook. f.

A small creeping herb. Leaves linear, tufted, entire. Peduncles solitary, terminal, 1-flowered. Flowers small, white. Calyx deeply 5-partite; segments linear. Corolla subrotate, deeply 5-lobed; lobes with broad thin margins, induplicate-valvate. Stamens 5; filaments short, broad; anthers oblong. Ovary 1-celled, with 2 parietal placentas; style very short; stigma broadly 2-lamellate. Fruit globose, fleshy or succulent, indehiscent. Seeds numerous; testa crustaceous.

A monotypic genus, confined to New Zealand and Tasmania.

1. *L. Gunnii*, *Hook. f. in Hook. Lond. Journ. Bot.* vi. (1847) 472.—Small, perfectly glabrous. Rhizome 3–9 in. long, stout, creeping, branched, emitting long thick rootlets. Leaves tufted, $\frac{1}{2}$ –1 in. long, narrow-linear or linear-spathulate, obtuse, thick and fleshy, with a broad membranous sheathing base, quite entire. Peduncles stout, much shorter than the leaves. Flowers small, $\frac{1}{8}$ in. diam. Calyx almost equalling the corolla; segments linear, fleshy, acute. Corolla divided $\frac{2}{3}$ -way down; lobes ovate, 3-nerved, margins undulate. Stamens inserted just below the sinus of the

lobes. Ovary broadly ovoid or almost globose; ovules numerous. Fruit globose, about $\frac{1}{4}$ in. diam. Seeds orbicular, somewhat compressed.—*Fl. Tasm.* i. 273, t. 87; *Benth. Fl. Austral.* iv. 381; *Petrie in Trans. N.Z. Inst.* xii. (1880) 354.

SOUTH ISLAND: Nelson—Mount Rochfort and other mountains near Westport, *Dr. Gaze! W. Townson!* Otago—Longwood Range, *Kirk!* STEWART ISLAND: Muddy flats at Port Pegasus and Paterson's Inlet, *Petrie! G. M. Thomson! Kirk!* Sea-level to 3500 ft.

A curious little plant, probably not uncommon in mountain bogs on the west side of the South Island.

ORDER LI. BORAGINACEÆ.

Annual or perennial herbs or more rarely trees or shrubs, usually rough with coarse hairs. Leaves alternate, seldom opposite, simple, entire or toothed; stipules wanting. Flowers regular, hermaphrodite, usually arranged in one-sided simple or forked gyrate spikes or racemes (in reality scorpioid cymes), rarely solitary. Calyx inferior, 5-lobed or -partite, persistent. Corolla gamopetalous, hypogynous; throat often closed with hairs or scales; lobes usually 5, seldom 4, imbricate. Stamens the same number as the lobes of the corolla and alternate with them, inserted on the tube or throat of the corolla; anthers 2-celled, opening lengthwise. Ovary superior, deeply 4-lobed and 4-celled in the majority of the species and in all those found in New Zealand, sometimes entire or 2-lobed; style from between the ovary-lobes or terminal; stigma capitate or 2-lobed; ovules solitary in each cell, ascending. Fruit usually composed of 4 indehiscent nutlets or pyrenes, rarely drupaceous. Seed erect or oblique, testa membranous; albumen copious or scanty or wanting; embryo straight or curved, radicle superior.

A large and widely distributed order, found in all parts of the world, the herbaceous genera most abundant in the Northern Hemisphere, especially in south Europe and the Levant; the shrubby and arborescent ones mainly tropical. Genera about 70; species estimated at 1200. The properties of the order are unimportant. Some of the species are mucilaginous and emollient, and have been used in medicine. The roots of others, such as *Anchusa* (alkanet), yield a red dye. The heliotrope, forget-me-not, and many others are cultivated for ornament. Of the three indigenous genera, *Myosotis* has a wide range in temperate climates; the remaining two are endemic.

* Calyx and corolla 5-lobed.

Leaves alternate. Racemes bractless. Nuts small, smooth and polished, on a flat receptacle	1. MYOSOTIS.
Leaves chiefly radical, large and broad. Nuts large, with broad wings, attached to a central conical receptacle ..	2. MYOSOTIDIUM.

** Calyx and corolla 4-lobed.

Small intricately branched herb. Leaves opposite ..	3. TETRACHONDRA.
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1. **MYOSOTIS**, Linn.

Annual or perennial herbs, usually more or less hispid. Leaves alternate, entire, radical petioled, cauline sessile. Flowers small, blue or white or yellow, in scorpioid simple or branched racemes destitute of bracts, or in the axils of the upper leaves, rarely solitary and terminal. Calyx 5-lobed or -partite; lobes narrow, hardly altered in fruit. Corolla with a cylindrical tube partly closed with 5 small scales in the throat; limb spreading, 5-lobed; lobes contorted in the bud. Stamens 5, affixed to the corolla-tube, included or exserted; anthers ovate or oblong. Ovary deeply 4-lobed; style filiform. Nutlets 4, ovoid-oblong, smooth and shining, attached by a small basal area.

A well-known genus of nearly 50 species, plentiful in the temperate regions of the Northern Hemisphere and in New Zealand, rare elsewhere. One of the New Zealand species extends to Australia, the rest are endemic.

I have followed the "Genera Plantarum" and Engler and Prantl's Pflanzenfamilien in reducing *Exarrhena* to a section of *Myosotis*. Its distinguishing characters lie in the usually large campanulate corolla, the stamens inserted high up the corolla-tube between the scales, so that the anthers are altogether above the level of the scales and exserted beyond the tube, and in the filaments being usually (but not invariably) longer than the anthers. But *M. albo-sericea* and *M. Goyeni* have the corolla of *Exarrhena* with the stamens of *Myosotis*, and a variety of *M. capitata* has the anthers exserted beyond the tube; while the position of the stamens on the corolla-tube varies in both *Myosotis* and *Exarrhena*.

The student must bear in mind that several species greatly resemble one another in habit and foliage, although widely different in the flowers. This is specially the case with *M. Forsteri*, a true *Myosotis*, and *M. petiolata*, an undoubted *Exarrhena*. *M. capitata*, *M. explanata*, *M. concinna*, and *M. macrantha* are all very near to one another in size, habit, and foliage, and all have unlike flowers.

Section I. (Eumyosotis). Stamens inserted on the corolla-tube; filaments shorter than the anthers, which are included in the tube, their tips not exceeding the corolla-scales.

* Flowers solitary, sessile, terminal. Leaves small, imbricate.

- | | | |
|--------------------------------------|--|---------------------------|
| Small, densely tufted, 2-6 in. diam. | Leaves $\frac{1}{2}$ in., linear-oblong | 1. <i>M. uniflora</i> . |
| Small, densely tufted, 2-4 in. diam. | Leaves $\frac{1}{6}$ - $\frac{1}{4}$ in., obovate-spathulate | 2. <i>M. pulvinaris</i> . |

** Flowers solitary and axillary.

- | | | |
|---|---|----------------------------|
| Small, densely tufted, 1-3 in. diam. | Leaves crowded. | |
| Flowers few, large, $\frac{1}{2}$ in. long, | corolla-tube twice as long as the calyx | 3. <i>M. Cheesemanii</i> . |
| Prostrate or decumbent, leafy, 1-6 in. long. | Leaves often distichous. | |
| Flowers minute, $\frac{1}{10}$ - $\frac{1}{8}$ in. long | | 4. <i>M. antarctica</i> . |
| Prostrate or decumbent, leafy, 1-2 in. long. | Flowers rather large, $\frac{1}{4}$ - $\frac{1}{2}$ in. long. | |
| Anthers very long, narrow-linear | | 5. <i>M. decora</i> . |

*** Flowers in terminal racemes without bracts, or the lower flowers alone axillary.

- Slender, erect, densely hispid, 6-16 in. high. Racemes elongated; pedicels short, erect. Nutlets ovoid, black 6. *M. australis*.
- Slender, weak, diffuse, 6-18 in. long. Racemes elongated, the lower flowers axillary; pedicels slender, spreading. Nutlets broadly ovoid, pale 7. *M. Forsteri*.
- Stout, erect, 6-14 in. high. Leaves coriaceous. Racemes short, stout, capitate. Flowers blue or white, $\frac{1}{2}$ - $\frac{1}{4}$ in. diam. Calyx small, $\frac{1}{2}$ in. long 8. *M. capitata*.
- Stout, erect, 6-12 in. high. Leaves submembranous, sparsely hispid. Racemes short, stout, capitate. Flowers $\frac{3}{4}$ in. diam., large, white. Calyx $\frac{1}{2}$ in. long .. 9. *M. explanata*.
- Short, stout, densely hispid, 2-6 in. high. Leaves linear-spathulate. Racemes short, capitate. Flowers $\frac{1}{4}$ - $\frac{1}{2}$ in. long, lemon-yellow. Filaments very short, the tip of the anthers just above the scales 10. *M. Traversii*.
- Size and habit of *M. Traversii*, but leaves rather narrower. Racemes capitate. Flowers $\frac{1}{2}$ in., white. Filaments as long as the anthers, which are wholly above the scales 11. *M. angustata*.
- Slender, 3-6 in. high, silvery-white with appressed silky hairs. Racemes long, slender. Flowers bright-yellow, $\frac{1}{2}$ in. long. Corolla campanulate, with a short tube and broad limb 12. *M. albo-sericea*.
- Slender, 4-10 in. high, hispid with short white hairs. Racemes long, slender. Flowers pale-yellow or white, large, $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Corolla campanulate, tube shorter than the limb 13. *M. Goyeni*.

Section II. (Exarrhena). Stamens usually inserted between the corolla-scales; filaments longer than the anthers, which always reach beyond the corolla-tube, and sometimes exceed the lobes.

- Flaccid, prostrate or decumbent. Leaves on slender petioles; blade orbicular or obovate, $\frac{1}{2}$ -1 in. long. Flowers small, solitary and axillary, $\frac{1}{2}$ in. long. Corolla-tube shorter than the limb 14. *M. spathulata*.
- Slender, diffuse, 4-14 in. high. Leaves on slender petioles; blade rounded-oblong, $\frac{2}{3}$ -2 in. Racemes long, slender. Flowers $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. Corolla-tube much shorter than the limb 15. *M. petiolata*.
- Slender, 6-12 in. high. Leaves membranous, sparsely hispid. Racemes long, simple. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. long. Corolla campanulate; tube broad, shorter than the limb 16. *M. laeta*.
- Rather stout, 3-9 in. high. Leaves 1-2 $\frac{1}{2}$ in., linear-obovate or obovate-spathulate, coriaceous, hispid on both surfaces. Racemes many-flowered. Flowers large, white, $\frac{1}{2}$ in. diam. 17. *M. amabilis*.
- Small, stout, 2-3 in. high. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong-spathulate, hispid and hoary on both surfaces. Racemes few-flowered. Flowers small 18. *M. saxosa*.
- Small, rather slender, 2-6 in. high. Leaves $\frac{3}{4}$ -2 in., lanceolate to obovate-spathulate, hispid on both surfaces or almost glabrous beneath. Racemes many-flowered. Flowers yellow, $\frac{1}{4}$ - $\frac{1}{2}$ in. long 19. *M. Monroi*.
- Stout, 2-6 in. high. Leaves 1-1 $\frac{1}{2}$ in., oblong-spathulate, sparingly hispid. Flowers $\frac{1}{4}$ in. long. Corolla funnel-shaped, tube longer than the limb 20. *M. Lyallii*.

Erect, silky with appressed hairs, 6-14 in. high. Leaves 2-4 in., lanceolate-spathulate. Flowers numerous, crowded, bright-yellow, $\frac{1}{2}$ - $\frac{2}{3}$ in. long. Corolla broadly funnel-shaped, tube broad, shorter than the limb .. 21. *M. concinna*.

Hispid with spreading or appressed hairs, 6-14 in. high. Leaves 2-6 in., lanceolate-spathulate. Flowers large, crowded, brownish-orange, $\frac{2}{3}$ -1 in. long. Corolla-tube twice as long as the limb 22. *M. macrantha*.

1. *M. uniflora*, Hook. f. *Handb. N.Z. Fl.* 192.—A small much and closely branched densely tufted perennial herb, forming rounded patches 2-6 in. diam., everywhere clothed with appressed rigid white hairs, giving the whole plant a greyish-white appearance; root woody, tortuous; branches densely leafy. Leaves closely imbricated, erect, $\frac{1}{4}$ in. long, linear-oblong or linear-lanceolate, obtuse or subacute, dilated at the base, almost glabrous above. Flowers solitary, terminal, almost sessile, about $\frac{1}{4}$ in. long, yellowish-white. Calyx-lobes linear-oblong, acute, clothed with straight rigid hairs. Corolla-tube cylindrical, twice as long as the calyx, throat with 5 emarginate scales; limb flat, spreading; lobes 5, short, rounded. Stamens 5; filaments very short; anthers linear-oblong, included, their tips just above the level of the corolla-scales. Nuts ovoid, acute.

SOUTH ISLAND: Canterbury—Sources of the Waimakariri, *Enys*! *T. F. C.*; Rangitata Valley, *Armstrong*! *W. W. Smith*! Wilberforce River, *Haast*! Tasman Valley, *T. F. C.*; Hopkins River, *Haast*. 2500-4000 ft. December-February.

A very curious little plant. The *M. uniflora* of Buchanan (*Trans. N.Z. Inst.* xiv. t. 33, f. 1) appears to me to be referable to the next species.

2. *M. pulvinaris*, Hook. f. *Handb. N.Z. Fl.* 193.—A small much-branched densely tufted perennial herb, forming soft rounded cushions 2-4 in. diam., more or less clothed with soft white hairs; branches short, densely compacted. Leaves most densely imbricated all round the branches, erect, closely overlapping, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, broadly obovate or obovate-spathulate, rounded at the tip, slightly narrowed to a broad sessile base, rather membranous, both surfaces clothed with long soft hairs or the lower half glabrous. Flowers white, solitary, terminal, almost sessile, about $\frac{1}{4}$ in. long. Calyx-lobes linear, acute, densely clothed with long straight hairs. Corolla-tube about twice as long as the calyx, throat with 5 scales; lobes 5, short, rounded, spreading. Stamens included, the tips of the anthers slightly above the level of the corolla-scales. Nuts ovoid, acute.—*Buch. in Trans. N.Z. Inst.* xiv. (1882) t. xxxiii. f. 2. *M. Hectori*, Hook. f. *Handb. N.Z. Fl.* 193; *Buch. l.c.* t. xxxiii. f. 3.

SOUTH ISLAND: Canterbury—Locality not stated, *J. F. Armstrong*! Otago—Mount Alta, *Hector* and *Buchanan*! Mount Pisa, Old Man Range, *Hector* Mountains, Mount Cardrona, and other high peaks to the west and north-west, *Petrie*! 4500-6500 ft. January-March.

Very variable in the shape and texture of the leaves and the extent to which they are covered with hairs. *M. Hectori* only differs in the rather broader and shorter leaves, and passes so insensibly into the type that it cannot be retained even as a variety.

3. *M. Cheesemanii*, *Petrie in Trans. N.Z. Inst.* xviii. (1886) 296.—A small perennial herb forming tufts 1–3 in. diam., more or less clothed in all its parts with long soft white hairs. Stems several from the root, 1–1½ in. long, spreading or ascending, densely leafy. Lower leaves ¼–½ in. long, obovate-spathulate, usually rounded at the tip, narrowed into a broad membranous almost glabrous 3-nerved base, upper portion coriaceous, hispid on both surfaces, margins ciliate with long hairs; cauline leaves smaller and narrower, more acute. Flowers 1–4 towards the tips of the branches, solitary, axillary, ⅓ in. long, white, sweet-scented. Calyx clothed with long straight hairs, 5-lobed to the middle; lobes lanceolate or linear-lanceolate, erect, acute. Corolla-tube funnel-shaped, almost twice as long as the calyx, throat with 5 lunate glands; lobes spreading, short, broad, rounded. Stamens included; filaments very short; the tips of the anthers equalling or slightly overtopping the corolla-scales. Nutlets narrow-ovoid, dark-brown, polished, acute.

SOUTH ISLAND: Otago—Mount Pisa and the Hector Mountains, on shingle slopes, *Petrie!* 4500–6000 ft.

A very pretty and distinct little species. In some respects it is allied to *M. Traversii*, but it is much smaller and more densely tufted, and the flowers are axillary, not racemose.

4. *M. antarctica*, *Hook. f. Fl. Antarct.* i. 57, t. 38.—Annual or perennial, more or less clothed in all its parts with spreading or appressed stiff white hairs. Stems numerous from the root, prostrate or decumbent, ascending at the tips, 1–6 in. long, usually densely leafy. Radical leaves ¼–1 in. long, narrow obovate-spathulate or oblong-spathulate, obtuse or apiculate, sessile or narrowed into a petiole of variable length, membranous or rather coriaceous; cauline smaller, sessile, often distichous. Flowers solitary and axillary, sessile or nearly so, minute, ⅓–½ in. long, white or yellow or blue. Calyx cut nearly half-way down, hispid with long straight hairs; lobes linear-lanceolate or ovate-lanceolate, acute. Corolla-tube cylindric, variable in length, in some forms barely exceeding the calyx, in others almost twice as long, throat with 5 scales; lobes very short, rounded. Stamens included; anther-tips usually reaching to the level of the corolla-scales. Fruiting calyx enlarged, open. Nutlets ovoid, acute, compressed, shining, black or nearly so.—*Fl. Nov. Zel.* i. 201; *Handb. N.Z. Fl.* 193. *M. pygmæa*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 334. *M. Traillii*, *Kirk in Trans. N.Z. Inst.* xvi. (1884) 373.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CAMPBELL ISLAND: Not uncommon from the Auckland Isthmus southwards, usually in dry rocky places. Sea-level to 4500 ft. November–February.

An extremely variable little plant. Specimens from dry alpine localities are often densely tufted, almost pulvinate, and are usually clothed with long villous hairs. On the other hand, I have specimens from shaded places near the Waimakariri Glacier with slender prostrate sparingly leafy stems 6 in. long, with radical leaves 2 in. long. Mr. Kirk's subspecies *Trailii* does not seem to me to differ in any essential particular.

5. *M. decora*, T. Kirk, MSS.—Perennial; hoary in all its parts with appressed rigid white hairs. Stems 1–2 in. long, prostrate or decumbent, suberect at the tips, leafy throughout. Radical leaves numerous, spreading, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, linear-oblong or linear-spathulate, acute, narrowed into a short broad petiole, coriaceous, both surfaces clothed with appressed stiff hairs; cauline much smaller, the upper ones sessile. Flowers solitary in the axils of the upper leaves, white, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, pedicels short. Calyx densely hispid with stiff white hairs, 4-lobed to the middle; lobes linear, acute. Corolla-tube longer than the calyx, throat with 5 scales; limb broad, with 5 rounded lobes. Stamens with very short filaments; anthers very long, linear, their tips projecting considerably above the level of the corolla-scales. Style long, slender. Nutlets oblong, smooth and polished, black.—*Exarrhena Colensoi*, Kirk in *Trans. N.Z. Inst.* xxvii. (1895) 351 (*in part*).

SOUTH ISLAND: Canterbury—Limestone rocks in the Broken River basin, *Enys! Kirk! Cockayne! T. F. C.* 2000–3500 ft. December–January.

A curious little plant, remarkable for the large linear anthers, the tips of which stand up considerably above the corolla-scales.

6. *M. australis*, R. Br. *Prodr.* 495.—An erect densely hispid perennial herb 6–16 in. high; stems usually branched from the base, slender or rather stout, sparingly leafy. Radical leaves $\frac{3}{4}$ –2 in. long, oblong-spathulate or linear-spathulate, obtuse, narrowed into long petioles, rather coriaceous, hispid on both surfaces; cauline distant, smaller and shorter, sessile, linear-oblong or linear-spathulate. Racemes elongated, many-flowered, hispid with spreading straight or hooked hairs. Flowers yellow or white, $\frac{1}{5}$ – $\frac{1}{4}$ in. long; pedicels very short. Calyx densely hispid with spreading hooked hairs, divided $\frac{3}{4}$ -way down or more; lobes linear-lanceolate, acute. Corolla-tube funnel-shaped, exceeding the calyx; throat with 5 scales; lobes short, rounded. Stamens included; anther-tips about level with the corolla-scales. Style shorter than the calyx or very slightly exceeding it. Nutlets narrow-ovoid, polished and shining, black when fully ripe.—*Hook. f. Fl. Nov. Zel.* i. 201; *Handb. N.Z. Fl.* 193; *Benth. Fl. Austral.* iv. 405.

Var. *conspicua*.—Flowers larger, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, $\frac{1}{4}$ in. diam., campanulate. Style considerably longer than the calyx.

NORTH ISLAND: Hawke's Bay—Kaweka Mountain, *H. Tryon*. SOUTH ISLAND: Abundant throughout. Sea-level to 4000 ft. December–February.

Closely allied to *M. Forsteri*, but easily distinguished by the more erect habit, more hispid stems and leaves and calyces, shorter and more erect pedicels, usually yellow flowers, and narrower black nutlets. It is a common Australian plant.

7. *M. Forsteri*, *Lehm. Asperif.* 95.—Usually perennial. Stems branched from the root, decumbent or almost prostrate below, ascending or suberect above, slender, flaccid, leafy, 6–18 in. long, more or less hispid or pilose with soft white hairs. Lower leaves on long slender petioles $\frac{1}{2}$ –2 in. long; blade $\frac{1}{2}$ –1 $\frac{1}{2}$ in., oblong or orbicular-oblong, obtuse or apiculate, rather membranous, both surfaces hispidulous. Racemes elongated, very many-flowered; the lower flowers often axillary; fruiting pedicels equalling the calyx or longer than it, spreading. Flowers about $\frac{1}{4}$ in. long, white or white with a yellow eye. Calyx campanulate, hispid with spreading hooked hairs, 5-lobed to the middle; lobes linear-oblong, acute. Corolla-tube funnel-shaped, slightly exceeding the calyx, throat with 5 scales; lobes short, rounded. Anthers included, their tips equalling the corolla-scales. Nutlets broadly ovoid or almost orbicular, pale-brown, shining.—*D.C. Prodr.* x. 110; *A. Cunn. Precur.* n. 393; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 200; *Handb. N.Z. Fl.* 194. *M. spathulata*, *A. Rich. Fl. Nov. Zel.* 198 (*non Forst.*). *M. Hamiltoni*, *Col. in Trans. N.Z. Inst.* xx. (1888) 201. *M. polyantha* and *M. tenuifolia*, *Col. l.c.* xxxi. (1899) 275, 276. (?) *M. venosa*, *Col. l.c.* xxviii. (1896) 606.

NORTH AND SOUTH ISLANDS: Not uncommon from the Bay of Islands to the south-west of Otago. Sea-level to 3500 ft. October–February.

8. *M. capitata*, *Hook. f. Fl. Antaret.* i. 56, t. 37.—Perennial; clothed in all its parts with soft spreading scarcely hispid hairs; rootstock long; stems one or several from the root, stout, ascending, simple, leafy. Radical leaves numerous, spreading, 1 $\frac{1}{2}$ –4 in. long, linear-obovate or linear-oblong or spathulate, obtuse, narrowed into a short broad petiole, clothed with soft spreading or appressed hairs above, much less hairy beneath; cauline smaller, the upper ones sessile. Racemes short, stout, simple or branched, usually forming a dense many-flowered head. Flowers $\frac{1}{4}$ in. long, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., shortly pedicelled, blue. Calyx hispid with appressed straight hairs, 5-lobed $\frac{3}{4}$ -way down; lobes linear, obtuse. Corolla-tube $\frac{1}{3}$ longer than the calyx, cylindrical, throat with 5 scales; limb flat, spreading, with 5 rounded lobes. Stamens included; filaments very short; anther-tips just above the level of the scales. Style long, slender. Nutlets ovoid, smooth and shining, black.—*Fl. Nov. Zel.* i. 200; *Handb. N.Z. Fl.* 194.

Var. *albiflora*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 340.—Stouter and coarser than the type, 6–18 in. high, more copiously hairy. Radical leaves 3–6 in. long, on rather longer petioles, thicker, often somewhat fleshy; cauline narrower. Flowers white. Stamens on filaments almost as long as the anthers; anthers altogether above the level of the corolla-scales.—*M. capitata* sub. *sp. albida*, *Kirk in Trans. N.Z. Inst.* xvii. (1885) 224.

SOUTH ISLAND: Otago—(var. *albiflora*) Cliffs on the east and south coasts, rare, *Lindsay, Buchanan! Petrie!* STEWART ISLAND AND THE SNARES: (var. *albiflora*) Plentiful on the coast, *Rev. Mr. Stack, Petrie! Kirk!* AUCKLAND AND CAMPBELL ISLANDS: The typical form not uncommon, *Sir J. D. Hooker, Kirk!* December–February.

I have seen no specimens of the typical form save from the Auckland and Campbell Islands, but a blue-flowered state is said to occur on cliffs near Dunedin which may be referable to it. The variety *albiflora* approaches *Exarrhena* in the stamens, but the filaments do not exceed the anthers.

9. *M. explanata*, *Cheesem. n. sp.*—Perennial; clothed in all its parts with short hardly rigid spreading white hairs; rootstock long, stout; stems usually numerous, simple, decumbent below, ascending or suberect above, leafy, 6–12 in. high. Radical leaves numerous, 2–4 in. long, linear-obovate or oblong-spathulate or linear-spathulate, obtuse or rarely subacute, narrowed into rather long broad petioles, membranous, uniformly but rather sparsely clothed on both surfaces with short soft white hairs; cauline smaller, sessile, linear-oblong or lanceolate. Racemes short, simple or branched, many-flowered, in the early flowering stage forming dense heads. Flowers large, $\frac{1}{2}$ in. long, $\frac{1}{2}$ – $\frac{2}{3}$ in. diam., pure white, very shortly pedicelled. Calyx rather more than $\frac{1}{3}$ in. long, hispid with straight or curved hairs; lobes linear, obtuse. Corolla-tube slightly longer than the calyx, slender, cylindrical, throat with 5 scales; limb broad, flat, spreading, with 5 rounded lobes. Stamens included; filaments very short; anther-tips level with the corolla-scales. Style long, slender. Nutlets narrow-oblong, obtuse, shining, black.

SOUTH ISLAND: Canterbury—Mountains above Arthur's Pass, *T. F. C., Cockayne!* Walker's Pass, *Cockayne.* 3000–4500 ft. January.

A very handsome plant. It differs from the typical state of *M. capitata* in the large pure white flowers (which are quite twice the size of those of *M. capitata*), in the large calyx, and in the more membranous less hairy leaves. *M. capitata* var. *albiflora* recedes in its larger size and coarser habit, and particularly in the anthers, which are altogether above the level of the corolla-scales, whereas they are always below in *M. explanata*.

10. *M. Traversii*, *Hook. f. Handb. N.Z. Fl.* 194.—Perennial, much branched from the base, 2–6 in. high; everywhere densely hispid with erect or spreading straight or hooked stiff white hairs; rootstock long, stout; stems erect or ascending, stout, leafy. Radical leaves 1–1½ in. long, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, linear-spathulate, obtuse, narrowed into short petioles, coriaceous, both surfaces rough and hispid; cauline numerous, linear-oblong, sessile, erect.

Racemes many-flowered, short, simple or branched, capitate, very densely hispid. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. long, sessile or nearly so, lemon-yellow, sweet-scented. Calyx densely hispid with straight or hooked hairs, deeply 5-lobed; lobes linear, acute. Corolla-tube $\frac{1}{3}$ longer than the calyx, narrow funnel-shaped, throat with 5 scales; lobes short, rounded. Stamens included; filaments very short; anthers with their tips just above the level of the scales. Style slender, almost equalling the corolla. Nutlets narrow-ovoid, obtuse, polished and shining, brownish-black.

SOUTH ISLAND: Bare shingle slopes on the higher mountains, not uncommon in Nelson, Canterbury, and Westland, less abundant in Otago. 2500–6000 ft. December–February.

A well-marked plant, whose nearest ally is the following species.

11. *M. angustata*, *Cheesem. n. sp.*—Size, habit, and general appearance of *M. Traversii*, and like it everywhere densely hispid with straight or hooked stiff white hairs. Leaves usually narrower, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad, narrow linear-spathulate, obtuse or subacute, gradually narrowed towards the base. Racemes many-flowered, short, simple or branched, when young forming a capitate head to the branches, very densely hispid. Flowers about $\frac{1}{3}$ in. long, sessile or nearly so, white. Calyx densely hispid with straight or hooked hairs, divided about two-thirds way down; lobes linear, erect, acute. Corolla-tube longer than the calyx, cylindrical, throat with 5 scales; lobes short, rounded. Stamens with filaments as long as the anthers, so placed that the anthers are wholly above the level of the scales, their tips reaching half-way up the corolla-lobes. Style slender, exceeding the corolla. Ripe fruit not seen.

SOUTH ISLAND: Nelson—Mount Arthur Plateau and Raglan Mountains, T. F. C. 3500–4500 ft. January.

I advance this as a distinct species with much hesitation, for at first sight there is little to separate it from *M. Traversii* except the slightly narrower leaves and white flowers. But the position of the anthers is altogether different, for in *M. Traversii* the filaments are excessively short, and the tips of the anthers are only just above the level of the scales, whereas in the present plant the filaments equal the anthers, which are altogether above the level of the scales. Technically, it should be placed in the section *Exarrhena*, but I am unwilling to remove it from the vicinity of *M. Traversii*.

12. *M. albo-sericea*, *Hook. f. Handb. N.Z. Fl.* 738.—Perennial; everywhere silvery white with closely appressed silky hairs; rootstock stout, woody, clothed with the remains of the old leaves; flowering stems one or several, rather slender, 3–6 in. high. Radical leaves very numerous, densely tufted, $\frac{1}{2}$ –1 in. long, $\frac{1}{10}$ – $\frac{1}{8}$ in. wide, narrow linear-spathulate, acute, gradually narrowed into a petiole longer than the blade, coriaceous, uniformly silky on both surfaces; cauline few, distant, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear-oblong or lanceo-

late. Racemes slender, many-flowered, naked. Flowers rather large, $\frac{1}{3}$ in. long or more, bright sulphur-yellow; pedicels very short. Calyx small, about $\frac{1}{3}$ the length of the corolla, clothed with appressed silky hairs; lobes linear, acute. Corolla broadly funnel-shaped or almost campanulate, tube short, broad above, with 5 scales in the throat; limb large, with rounded lobes. Stamens included, the tips of the anthers reaching the corolla-scales. Style long, almost equalling the corolla. Nutlets ovoid, pale greyish-brown.

SOUTH ISLAND: Otago—Hills near Cromwell, Clutha River, *Hector* and *Buchanan*! *Petrie*! 800–1500 ft.

A curious and distinct species, only known from one locality, where it is fast becoming exceedingly rare.

13. **M. Goyeni**, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 400.—Perennial; everywhere clothed with short rigid appressed white hairs, giving the whole plant a greyish appearance. Rootstock stout, woody; flowering stems one or several, decumbent at the base, ascending or erect at the tips, slender, branched, 4–10 in. long. Radical leaves numerous, tufted, $1\frac{1}{2}$ –3 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, linear-spathulate, acute, gradually narrowed into a slender petiole much longer than the blade, coriaceous, uniformly hispid on both surfaces; cauline smaller and on shorter petioles, the upper sessile. Racemes slender, naked, many-flowered. Flowers large, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, pale-yellow or white with a yellow centre, almost sessile or on very short pedicels. Calyx small, $\frac{1}{3}$ as long as the corolla, deeply 5-lobed; lobes linear-subulate, acute. Corolla broadly funnel-shaped; tube short, broad above, with 5 scales at the throat; limb large, with short rounded lobes. Stamens included, the tips of the anthers reaching the corolla-scales. Style slender, $\frac{3}{4}$ the length of the corolla. Nutlets ovoid, brownish.

SOUTH ISLAND: Nelson—Mount Percival, Hanmer, *T. F. C.* Otago—Arrowtown, Cardrona Valley, Lake Hawea, *Petrie*! 1000–4000 ft. November–January.

Very near to *M. albo-sericea*, but a much larger plant, with longer branched stems, greyish (not silvery-white) pubescence, and larger flowers, which are often quite white.

14. **M. spathulata**, *Forst. Prodr.* n. 62.—Pilose or hispid in all its parts. Stems usually many from the root, branched, prostrate, ascending at the tips, slender, flaccid, sparingly leafy, 3–16 in. long. Leaves on long or short petioles; blade $\frac{1}{3}$ –1 in. long, orbicular or broadly ovate or obovate, obtuse or apiculate, membranous, hispidulous on both surfaces; cauline smaller and on shorter petioles. Flowers small, $\frac{1}{3}$ in. long, white with a yellow eye, solitary, axillary or springing from the branches below the leaves. Calyx hispid with long straight hairs, cut $\frac{3}{4}$ -way down;

lobes linear-lanceolate, acute. Corolla funnel-shaped; tube short, hardly exceeding the calyx, throat naked or furnished with 5 scales, limb equalling the tube or slightly longer than it. Stamens inserted on the corolla-tube; filaments longer than the anthers, sometimes elongated; anthers altogether above the level of the scales and frequently reaching $\frac{3}{4}$ -way up the corolla-lobes. Nutlets ovoid, pale-brown, smooth and shining, much compressed, margins thin.—*D.C. Prodr.* x. 112; *Hook. f. Fl. Nov. Zel.* i. 201; *Handb. N.Z. Fl.* 193. *Anchusa spathulata*, *R. Br. ex Ræm. and Schult. Syst.* iv. 100; *A. Cunn. Precur.* n. 392; *Raoul, Choix*, 43.

NORTH AND SOUTH ISLANDS: Moist lowland stations from the Three Kings Islands southwards, not common. CHATHAM ISLANDS: *Cox* and *Cockayne*! November–January.

A very variable plant. Small states sometimes have the throat of the corolla either without scales or with very obscure ones. This character was used by De Candolle to constitute his subgenus *Gymnomyosotis*, but there is a gradual transition from flowers without scales to others in which they are as well developed as in other species of the genus, and looking at the fact that the filaments are at least longer than the anthers it seems best to place the species in the subgenus *Exarrhena*, and in the neighbourhood of *M. petiolata*.

Some specimens collected by Petrie at Inch-Clutha (Otago) and by Kirk at Winton (Southland) have precisely the habit of *M. spathulata*, and the calyx and fruit are the same. But the flowers are rather smaller, the throat of the corolla is furnished with evident scales, and the filaments are shorter than the anthers, so that the latter are entirely included in the corolla-tube, their tips not reaching the level of the scales. This form will probably prove to be a distinct species.

15. *M. petiolata*, *Hook. f. Fl. Nov. Zel.* i. 202.—Perennial; sparsely clothed with short white scabrid hairs; rootstock long, stout or slender; stems usually numerous, decumbent or prostrate at the base, then ascending, slender, sparingly leafy, 4–14 in. long. Radical and lower cauline leaves on long slender petioles $\frac{1}{2}$ –3 in. long; blade $\frac{2}{3}$ –2 in., broadly elliptic-oblong or elliptic-obovate, apiculate or rounded or retuse at the tip, thin and membranous, both surfaces slightly scabrid; upper cauline sessile, broadly obovate-spathulate. Racemes long, slender, many-flowered, simple or forked. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., white or white with a yellow eye; pedicels rather long, slender, spreading. Calyx clothed with straight appressed hairs, 5-lobed almost to the base; lobes linear, acute. Corolla broad, campanulate; tube very short, with 5 scales at the throat; limb several times longer than the tube, deeply 5-lobed; lobes oblong, spreading. Stamens with long and slender filaments; anthers far exserted beyond the tube, almost reaching the top of the corolla-lobes. Nutlets broadly ovoid, polished and shining, dark red-brown or black.—*Exarrhena petiolata*, *Hook. f. Handb. N.Z. Fl.* 195.

NORTH ISLAND: Cliffs north of the Manukau Harbour, *T. F. C.*; East Cape, *Bishop Williams*! Hawke's Bay and Cape Turnagain, *Colenso*! Patangata,

Tryon; near Mount Egmont, *Buchanan*; Ruahine Mountains, *H. Hill*. SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.* Sea-level to 3000 ft. November–January.

In habit and foliage this closely resembles large states of *M. Forsteri*, but the flowers are altogether unlike.

16. *M. laeta*, *Cheesem. in Trans. N.Z. Inst. xvii.* (1885) 236. —Perennial; sparingly clothed with short white hispid hairs. Flowering stems one or few from the root, slender, erect, sparingly leafy, 6–12 in. high. Radical leaves 1–3 in. long, rarely more, oblong-spathulate or narrow obovate-spathulate, obtuse or acute, gradually narrowed into rather long petioles, membranous, both surfaces sparingly hispid; cauline few, linear-oblong or lanceolate, sessile, acute. Racemes elongate, simple, many-flowered; pedicels slender. Flowers $\frac{1}{3}$ – $\frac{1}{2}$ in. long, yellow or white with a yellow eye. Calyx hispid with straight or hooked white hairs, 5-partite $\frac{3}{4}$ -way down; lobes linear, acute. Corolla campanulate; tube short, throat with 5 scales; limb large, with 5 short rounded lobes. Stamens with long slender filaments; anthers reaching almost to the top of the corolla-lobes. Style exserted. Nutlets ovoid, pale-brown.

NORTH ISLAND: Hawke's Bay, *H. Tryon*! SOUTH ISLAND: Nelson—Mountains flanking the Wairau Valley, *T. F. C.* Marlborough—Kaikoura Mountains, *Buchanan*! Canterbury—Ashburton Mountains, *Potts*! 1500–4000 ft. December–February.

In the shape of the corolla this much resembles *M. Goyeni*; but the anthers are on long slender filaments, and are exserted far beyond the corolla-tube, almost reaching the top of the lobes.

17. *M. amabilis*, *Cheesem. n. sp.* —Perennial; everywhere densely clothed with soft white hairs; rootstock stout; flowering stems usually several, rather stout, decumbent at the base, erect above, leafy, 3–9 in. high. Radical leaves numerous, 1–2½ in. long, linear-obovate or obovate-spathulate, obtuse, narrowed into rather long broad petioles, coriaceous, equally hoary on both surfaces with short soft white hairs; cauline smaller, sessile, oblong-lanceolate or linear-oblong, acute. Racemes pedunculate, simple or forked, at first short and capitate, but lengthening as the flowering advances, many-flowered. Flowers large, white, $\frac{1}{2}$ – $\frac{2}{3}$ in. long, $\frac{1}{2}$ in. diam., very shortly pedicelled. Calyx $\frac{1}{3}$ in. long, densely hispid with soft white hairs, lobed about two-thirds way down; lobes lanceolate, acute. Corolla large, campanulate or broadly funnel-shaped; tube exceeding the calyx, with 5 rather narrow scales at the mouth; limb large, with 5 rounded veined lobes. Stamens attached above the level of the scales; filaments nearly twice the length of the anthers, which reach more than half-way up the corolla-lobes. Ripe fruit not seen.

NORTH ISLAND: Auckland—Summit of Mount Hikurangi, East Cape district, altitude 5000 ft., *Petrie and Adams!* January.

Evidently a very handsome plant. In habit and foliage it much resembles *M. explanata*, but is smaller and stouter, with more copious hairs, and the flowers are altogether different in structure. Mr. Brown, who has compared specimens with the types at Kew, remarks that "it differs from the type of *M. saxosa* in its larger habit, larger leaves (which are nearly 2 diameters larger than those of *M. saxosa* and have a different undersurface), and the calyx is also narrower and less erect. It is more like *M. Lyallii*, but the flowers are more numerous and denser, and the leaves are hairy all over beneath, whilst in *M. Lyallii* it is only on the midrib that they are hairy beneath."

18. *M. saxosa*, *Hook. f. Fl. Nov. Zel. i. 202.*—Perennial, small, stout, leafy, very densely hispid with rather long soft white hairs. Flowering stems decumbent at the base, ascending above, 2-3 in. high. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in. long, linear-spathulate, subacute or apiculate, on broad petioles. Racemes pedunculate, few-flowered; flowers crowded, shortly pedicellate. Calyx nearly $\frac{1}{4}$ in. long, deeply 5-partite; lobes linear. Corolla funnel-shaped; throat with 5 scales. Anthers slightly exserted.—*Exarrhena saxosa*, *Hook. f. Handb. N.Z. Fl. 196*, so far as the North Island specimens are concerned. *E. Colensoi*, *Kirk in Trans. N.Z. Inst. xxvii. (1895) 351 (in part).*

NORTH ISLAND: Hawke's Bay—Crags at Titikura, *Colenso*.

Apparently this has not been gathered since its discovery by Colenso, more than sixty years ago, for the Nelson plant united with it in the Handbook has proved to be distinct. Not having seen specimens, I am unable to do more than to reproduce in its chief features Hooker's original description given in the Flora. Mr. N. E. Brown remarks "that the only species resembling it at Kew are *M. Cheesemanii*, *Petrie*, and *M. Traversii*, *Hook. f.*, from both of which it is quite distinct."

19. *M. Monroi*, *Cheesem. n. sp.*—Perennial; more or less hispid with short stiff white hairs. Flowering stems several from the root, slender, decumbent below, erect or ascending above, 2-6 in. high. Radical leaves numerous, $\frac{3}{4}$ -2 in. long, narrow obovate-spathulate or lanceolate-spathulate, obtuse or subacute, narrowed into a rather long slender petiole, hispid with short stiff white hairs on the upper surface, more sparingly so beneath and sometimes glabrous except the midrib; cauline smaller and narrower, lanceolate or linear-lanceolate, acute, sessile. Racemes pedunculate, simple or forked, many-flowered. Flowers yellow, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, shortly pedicelled. Calyx hispid with stiff white hairs, deeply lobed; lobes erect, linear, acute. Corolla funnel-shaped; tube cylindric, rather longer than the calyx, throat with 5 scales; limb spreading, shortly lobed; lobes broad, rounded. Stamens inserted between the corolla-scales; filaments twice the length of the anthers, which usually overtop the corolla-lobes. Ripe fruit not seen.—*M. saxosa*, *Hook. f. Handb. N.Z. Fl. 196 (in part).*

SOUTH ISLAND: Nelson—Dun Mountain, *Monro, Travers! Buchanan! Kingsley! T. F. C.*; Red Hills (Wairau Valley), *T. F. C.* 3000–4500 ft. December–February.

In the Handbook this was confused with *M. saxosa*. I have long been convinced of its distinctness; and Mr. N. E. Brown, who has kindly compared my specimens with the type of *M. saxosa*, informs me that the two are in reality very different.

20. **M. Lyallii**, *Hook. f. Fl. Nov. Zel. i.* 202.—“A rather short and stout tufted perennial, slightly hispid with appressed hairs. Stems several from the root, erect or ascending, rather stout, 2–6 in. high. Leaves: radical oblong-spathulate or obovate-lanceolate, subacute, 1–1½ in. long, narrowed into rather slender petioles; cauline narrow linear-oblong or oblong-spathulate, all slightly hispidulous on both surfaces with appressed hairs. Racemes short, simple or forked. Flowers very shortly pedicelled. Calyx ¼ in. long, hispid with appressed or patent, simple and hooked bristles. Corolla ⅙–¼ in. long; tube cylindric, longer than the calyx; lobes short, rounded. Stamens with long slender filaments; anthers linear. Nuts broadly ovate or orbicular, very black and shining.” —*Exarrhena Lyallii*, *Hook. f. Handb. N.Z. Fl.* 196. ?? *Myosotis* (*Exarrhena*) *oreophila*, *Petrie in Trans. N.Z. Inst.* xxviii (1896) 539.

SOUTH ISLAND: Otago—Milford Sound, *Lyall*. “Habit of a small specimen of *M. capitata*, but the flower is very different. I have but two specimens.”

I am unacquainted with this, which apparently has not been gathered since its original discovery by Dr. Lyall, and in the absence of any additional information I have reproduced Sir J. D. Hooker's description.

21. **M. concinna**, *Cheesem. in Trans. N.Z. Inst.* xvii. (1885) 235. —Perennial; everywhere clothed with fine closely appressed soft silky hairs; rootstock rather long, stout. Flowering stems numerous, rather slender, ascending or erect, leafy, 6–14 in. high. Radical leaves numerous, 2–4 in. long, linear- or lanceolate-spathulate to narrow oblong-spathulate, acute or obtuse, gradually narrowed into long rather slender petioles, both surfaces uniformly clothed with soft silky appressed hairs, midrib usually distinct; cauline oblong-lanceolate or linear-oblong, sessile, acute. Racemes many-flowered, simple or forked, at first short and almost capitate, but elongating as the flowering advances. Flowers large, crowded, ½–⅔ in. long, bright pale-yellow or more rarely white with a yellow eye, sweet-scented, pedicellate. Calyx covered with appressed silky hairs, 5-partite; lobes linear-lanceolate, obtuse. Corolla broadly funnel-shaped; tube short, hardly exceeding the calyx, throat with 5 scales; limb large, rather longer than the tube, deeply lobed; lobes oblong-ovate, obtuse or acute. Stamens with very slender elongated filaments; anthers exserted beyond the corolla-lobes. Nutlets ovoid, red-brown, but not seen quite ripe.

SOUTH ISLAND: Nelson—Limestone rocks on Mount Owen; Mount Arthur, T. F. C. 3500–4500 ft. January.

Habit of *M. macrantha*, but at once distinguished by the more silky indumentum, colour of the flowers, and particularly by the shape of the corolla, which has a short tube and large deeply divided limb, whereas in *M. macrantha* the tube is very long and the divisions of the limb comparatively shallow. The filaments are also much longer than in *M. macrantha*.

22. *M. macrantha*, Hook. f. & Benth. Gen. Plant. ii. 859.—Perennial; more or less densely clothed with soft spreading or appressed hairs; rootstock stout; flowering stems numerous, ascending, rather stout, leafy, 6–14 in. high. Radical leaves 2–6 in. long, lanceolate-spathulate or oblong-lanceolate, obtuse or subacute, narrowed into rather long broad petioles, both surfaces clothed with rather soft appressed hairs; cauline linear-oblong, sessile or the lower alone shortly petioled. Racemes many-flowered, simple or branched, short in the flowering stage but elongating in fruit, densely softly hispid. Flowers large, crowded, $\frac{2}{3}$ –1 in. long, brownish-orange, deliciously sweet-scented; pedicels very short. Calyx hispid with straight or hooked hairs, 5-lobed $\frac{3}{4}$ -way down; lobes linear, obtuse or subacute. Corolla funnel-shaped; tube long and slender, twice the length of the calyx, throat with 5 scales; limb with 5 oblong obtuse lobes. Stamens with filaments as long as or rather longer than the anthers; anthers wholly above the level of the scales. Style slender, longer than the corolla. Nutlets linear-oblong, shining, black.—*Exarrhena macrantha*, Hook. f. Handb. N.Z. Fl. 195.

Var. *pulchra*.—Similar in size and habit, but more diffuse and less hispid. Leaves thinner and more membranous, sometimes almost glabrous beneath. Corolla $\frac{3}{4}$ –1 in. long; tube much broader, almost campanulate, scales wanting in all the flowers examined. Filaments shorter than the anthers; anthers just reaching the sinus between the corolla-lobes.

SOUTH ISLAND: Subalpine localities from Nelson to the south-west of Otago; not uncommon, especially in the central and western portions of the Southern Alps. 2000–5000 ft. December–February.

A remarkably handsome plant. The filaments are never much longer than the anthers, and in var. *pulchra* are nearly as short as in the typical species of *Myosotis*, but as they are inserted high up the tube the anthers reach well up the corolla-limb.

2. MYOSOTIDIUM, Hook.

A stout succulent herb, 1–3 ft. high. Radical leaves large, broadly ovate-cordate or almost reniform; cauline sessile. Flowers blue, in dense corymbose cymes. Calyx deeply 5-partite. Corolla-tube short, throat with 5 protuberances; limb subrotate; lobes 5, spreading, obtuse, imbricate. Stamens 5, affixed to the tube of the corolla; filaments very short; anthers included. Ovary 4-lobed;

style very short, thick; stigma capitate. Fruit large, thick and spongy, pyramidal, 4-angled, composed of 4 coriaceous winged nutlets adhering to a central column.

A very remarkable monotypic genus confined to the Clatham Islands.

1. **M. nobile**, *Hook. Bot. Mag.* t. 5137.—Perennial, stout, pilose; rootstock long, thick, cylindrical. Radical leaves crowded, 6–12 in. long, broadly ovate-cordate or reniform, petioled, very thick and fleshy, bright-green and glabrous, strongly nerved; cauline few, broadly ovate or oblong, sessile. Cymes dense, subglobose, 3–6 in. diam., many-flowered. Flowers $\frac{1}{2}$ in. diam., dark-blue in the centre, fading towards the outside, scentless; pedicels $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Calyx-lobes broadly oblong, obtuse, more or less hispid with short appressed hairs. Corolla rotate; tube short; limb spreading, lobes rounded. Fruit $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.—*Hook. f. Handb. N.Z. Fl.* 196; *F. Muell. Veg. Chath. Is.* 32; *Buch. in Trans. N.Z. Inst.* vii. (1875) t. 12.

CHATHAM ISLANDS: Sandy soil near the sea, *Travers!* *Enys!* *Chatham Islands Lily.*

A noble plant, once very abundant on the coast-line of the Chatham Islands, but now fast becoming rare in a wild state.

3. **TETRACHONDRA**, *Petrie.*

A small creeping densely matted perennial herb, glabrous or nearly so. Leaves small, all opposite, elliptic-oblong, obtuse, quite entire; petioles broad, connate at the base. Flowers terminating short axillary branchlets, minute, solitary, tetramerous. Calyx persistent, deeply 4-fid; segments ovate, obtuse. Corolla slightly longer than the calyx, subrotate; tube very short, naked; limb with 4 ovate lobes imbricate in the bud. Stamens 4, inserted at the base of the sinus between the corolla-lobes; filaments as long or rather longer than the anthers; anthers 2-celled, small, rounded, dorsifixed. Ovary 4-partite to the base; style erect from between the lobes, twice as long as the ovary; stigma small. Nutlets 4, attached by a small base, rounded at the back and top, setulose, longer than the persistent calyx and style. Seed erect, albuminous; embryo cylindrical, almost as long as the albumen; cotyledons equalling the radicle.

1. **T. Hamiltonii**, *Petrie in Hook. Ic. Plant.* t. 2250.—Forming densely matted patches several inches in diameter. Leaves $\frac{1}{12}$ – $\frac{1}{10}$ in. long, rather fleshy, obscurely dotted. Flowers minute, $\frac{1}{12}$ in. diam.—*Trans. N.Z. Inst.* xxv. (1893) 269. *Tillæa Hamiltonii*, *Kirk ex W. S. Hamilton in Trans. N.Z. Inst.* xvii. (1885) 292.

SOUTH ISLAND: Otago—Lowlands in the south and east. Between the Lee Stream and Taieri; Hindon; Waipahi; Invercargill, *Petrie!* Makarewa River, *W. S. Hamilton!* Sea-level to 1800 ft.

A remarkable little plant, the systematic position of which is very doubtful. It was originally placed in *Tillæa* by Kirk, and no doubt there is considerable outward similarity with that genus, although it differs fundamentally in the gamopetalous corolla, the 4-lobed ovary, and the simple imbedded style. Prof. Oliver, no doubt influenced by the 4-lobed ovary, transferred it to the *Boraginaceæ*, although he points out ("Icones Plantarum," t. 2250) that it departs from the characters of the order in the opposite leaves connate at the base, and in the albuminous seeds. Dr. Hans Hallier, in an interesting paper printed in the "Berichten der Deutschen Botanischen Gesellschaft" for 1902, suggests that it should be considered an anomalous member of the *Scrophularineæ*, and that its nearest ally is the section *Pygmea* of *Veronica*. A study of the early development of the corolla would probably either prove or disprove this view.

ORDER LII. CONVULVACEÆ.

Herbs or shrubs, frequently twining, often with milky juice. Leaves alternate, exstipulate, wanting in *Cuscuta*. Flowers regular, usually hermaphrodite, axillary, solitary or cymose, often large and showy. Calyx inferior, persistent, usually of 5 distinct imbricated sepals. Corolla gamopetalous, hypogynous, campanulate or funnel-shaped or rotate, limb shortly or deeply 5-lobed or almost entire, often plaited and contorted in bud. Stamens 5, inserted on the tube of the corolla and alternate with its lobes; anthers oblong, opening lengthwise. Ovary superior, usually surrounded by an annular disc, 2-4-celled, rarely 1-celled, sometimes divided into 2-4 distinct carpels; style single or 2; stigma capitate or 2-lobed or branched; ovules usually 2 in each cell or carpel, erect, anatropous. Fruit a 1-4-celled capsule, 2-4-valved or bursting transversely or irregularly, rarely succulent and indehiscent. Seeds erect; albumen scanty or wanting; embryo curved, cotyledons broad, much folded and crumpled (in *Cuscuta* the embryo is spiral and undivided).

A moderately large order, widely spread over the whole world, but most plentiful in warm or tropical climates. Genera 32; species about 800. As a rule, the roots abound in a milky and acrid juice, which is often strongly purgative and used in medicine, as jalap and scammony. In some species the roots are inert and edible, as the common sweet potato, so largely cultivated in all warm countries. Many species of *Ipomœa* and allied genera are grown for the sake of their large and showy flowers. All the New Zealand genera have a wide range.

* *Leafy plants, twining or prostrate.*

† Corolla plaited. Style single.

Ovary 2-4-celled. Stigma capitate, or lobes globose	..	1. IPOMŒA.
Ovary imperfectly 2-celled. Stigmas 2, oblong, flat.	..	
Bracts large, enclosing the calyx	.. ..	2. CALYSTEGIA.
Ovary 1-celled. Stigmas 2, linear, flat. Bracts small or wanting	3. CONVULVULUS.

†† Corolla rotate. Styles 2.

Ovary of 2 separate carpels	4. DICHONDRA.
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** *Leafless twining parasites.*

Corolla small, campanulate	5. CUSCUTA.
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1. **IPOMŒA**, Linn.

Twining or prostrate herbs, rarely suberect. Leaves alternate, entire or lobed or divided. Flowers usually large and handsome, axillary, solitary or cymose. Sepals broad or narrow, equal or unequal, erect in fruit or rarely spreading. Corolla campanulate or funnel-shaped; tube long or short; limb entire or 5-angled, more rarely slightly 5-lobed. Stamens included or exerted, often unequal; filaments filiform or dilated at the base; anthers oblong or linear, ultimately twisted or straight. Ovary 2-celled, 4-ovuled, rarely 4-celled and 4-ovuled or 3-celled and 6-ovuled; style filiform; stigma entire and capitate, or shortly 2-lobed with globular lobes. Capsule globose or ovoid, 4- or rarely 2-3-valved. Seeds as many as the ovules or fewer, glabrous or pubescent.

Taken in a wide sense, this is a genus of between 300 and 400 species, spread through all warm climates. Both the New Zealand species have a wide range in tropical countries.

Leaves digitately divided	..	..	..	1. <i>I. palmata</i> .
Leaves obtusely 2-lobed, thick and fleshy	..	..	..	2. <i>I. biloba</i> .

The kumara or sweet potato (*Ipomœa batatas*, Lamk.; *Convolvulus chryso-rhizus*, Forst.) was introduced by the Maoris from Polynesia when they first colonised New Zealand, and constituted their chief vegetable food when the country became known to Europeans. It is still extensively grown, but has no claim to be included among the indigenous species.

1. ***I. palmata***, Forsk. *Fl. Egypt. Arab.* 43.—A slender glabrous twiner; stems many feet in length, the old ones more or less tuberculate. Leaves 1-3 in. diam., digitately divided almost to the base; lobes 5-7, lanceolate or elliptic-lanceolate, obtuse or subacute, entire or the outer ones irregularly lobed, rather membranous. Peduncles erect, 1-2 in. long, 1-3-flowered. Sepals $\frac{1}{4}$ - $\frac{1}{3}$ in. long, ovate, obtuse or subacute. Corolla large, 2-3 in. diam., pale-purple with a darker centre. Capsule nearly $\frac{1}{2}$ in. diam., ovoid-globose, glabrous, 2-celled. Seeds 2-4, villous.—*Benth. Fl. Austral.* iv. 415. *I. pendula*, R. Br. *Prodr.* 486; *A. Cunn. Precur.* n. 396; *Ruoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 184. *I. tuberculata*, Rœm. and Schultes *Syst.* iv. 208; *Hook. f. Handb. N.Z. Fl.* 199.

KERMADEC ISLANDS: Sunday Island, not uncommon on the cliffs, *T. F. C.*
NORTH ISLAND: Sea-cliffs from the North Cape to the Bay of Islands and Hokianga. December-April.

An abundant plant in the tropics of both hemispheres, attaining its southern limit in New Zealand.

2. ***I. biloba***, Forsk. *Fl. Egypt. Arab.* 44.—Perfectly glabrous; stems prostrate or trailing, sometimes 40 ft. long. Leaves on petioles 1-4 in. long; blade often broader than long, 1-4 in. across, orbicular or broadly obovate or oblong, emarginate or shortly and obtusely 2-lobed, thick and fleshy, prominently veined. Peduncles

about as long as the leaves, 1-3-flowered. Sepals ovate, obtuse. Corolla 1-2 in. diam., broadly campanulate with a somewhat tubular base, purplish or pink. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ovoid-globose, coriaceous, 2-celled. Seeds large, hairy.—*I. pes-capræ*, *Roth. Nov. Sp. Plant.* 109; *Benth. Fl. Austral.* iv. 419; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 171.

KERMADEC ISLANDS: Sunday Island, abundant in the sandy bays and on some of the cliffs, *T. F. C.* Plentiful on all tropical shores.

2. CALYSTEGIA, R. Br.

Prostrate or twining herbs, glabrous or nearly so. Leaves alternate, entire or rarely palmately lobed. Peduncles axillary, 1-flowered; bracts 2, large, persistent, enclosing the calyx. Flowers usually large. Sepals equal or the inner slightly smaller. Corolla campanulate or funnel-shaped; limb plaited, 5-angled or obscurely 5-lobed. Stamens included; filaments dilated at the base; anthers oblong. Ovary 1-celled or imperfectly 2-celled, 4-ovuled; style filiform; stigmas 2, ovate or oblong, flattened. Capsule subglobose, usually 1-celled. Seeds glabrous.

A small genus of 7 or 8 species, scattered through the warm and temperate regions of both hemispheres. Of the 4 New Zealand species 2 are found in most extra-tropical countries, one extends to Australia, and the remaining one to South America and the Island of Masafuera.

* Flowers large, 1-3 in. diam.

- | | |
|---|---------------------------|
| Leaves 2-5 in., oblong-sagittate, sinus at the base narrow,
deep | 1. <i>C. sepium</i> . |
| Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., ovate-cordate or deltoid, membranous,
sinus at the base broad, shallow | 2. <i>C. tuguriorum</i> . |
| Stems short, prostrate. Leaves $\frac{1}{2}$ -2 in. across, broader
than long, reniform, fleshy, sinus at the base broad,
shallow | 3. <i>C. Soldanella</i> . |

** Flowers small, $\frac{1}{2}$ in. diam.

- | | |
|---|--------------------------|
| Leaves sagittate, basal lobes narrow, acute, diverging .. | 4. <i>C. marginata</i> . |
|---|--------------------------|

1. *C. sepium*, *R. Br. Prodr.* 483.—Rhizome long, slender, extensively creeping underground. Stems slender, twining, 3-6 ft. long. Leaves alternate, variable in size and shape, 2-5 in. long, oblong-sagittate or hastate, acute or acuminate, rarely obtuse, cordate at the base with the lobes angular or truncate or rounded, membranous, glabrous or rarely slightly pubescent. Peduncles solitary, 1-flowered, angled or margined, often exceeding the leaves; bracts large, ovate or ovate-lanceolate, enclosing the calyx. Sepals subequal, ovate-lanceolate. Corolla large, 1 $\frac{1}{2}$ -3 in. diam., white or pink. Ovary incompletely 2-celled. Capsule $\frac{1}{2}$ in. diam., globose, apiculate. Seeds smooth.—*A. Cunn. Precur.* n. 394; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 183. *Convolvulus sepium*, *Linn. Sp. Plant.* 153; *Hook. f. Handb. N.Z. Fl.* 197.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant in lowland situations as far south as Canterbury, apparently local in Otago. *Pohue*; *Panahe*; *Bindweed*. November–March.

Widely dispersed in most temperate countries, and everywhere highly variable.

2. *C. tuguriorum*, *R. Br. ex Hook. f. Fl. Nov. Zel.* i. 183, t. 47.—Stems slender, prostrate or climbing, often clothing shrubs or trees to a considerable height, glabrous or puberulous. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, broadly ovate-cordate or deltoid, acute or obtusely acuminate, entire or sinuate or angled, sinus at the base broad and shallow, glabrous, membranous. Peduncles usually longer than the leaves, terete or margined; bracts ovate-cordate or orbicular, apiculate, equalling the calyx and enclosing it. Sepals subequal, broadly ovate. Corolla large, 1–2 in. diam., white. Ovary incompletely 2-celled. Capsule $\frac{1}{3}$ in. long, broadly ovoid, apiculate. Seeds yellowish-red. — *Convolvulus tuguriorum*, *Forst. Prodr.* n. 74; *Hook. f. Handb. N.Z. Fl.* 198. *C. truncatella*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 95.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant from the Three Kings Islands and the North Cape to Foveaux Strait. December–February.

According to Sir J. D. Hooker, this is also found in Valdivia and Chiloe, and Mr. Hemsley (Bot. “Challenger” Exped.) has recorded it from the Island of Masafuera.

3. *C. Soldanella*, *R. Br. Prodr.* 483.—Rhizome long, creeping underground. Stems rather stout, 6–18 in. long; rarely more, prostrate and trailing, not twining, glabrous or puberulous. Leaves on petioles 1–3 in. long; blade $\frac{1}{2}$ –2 in. diam., usually broader than long, reniform or broadly rounded-cordate, obtuse or apiculate, entire or sinuate, thick and fleshy, sinus at the base broad and shallow. Peduncles solitary, 1-flowered, as long or longer than the leaves; bracts ovate-cordate, obtuse, rather shorter than the calyx. — Sepals subequal, broadly ovate, obtuse. Corolla large, 1– $1\frac{1}{2}$ in. diam., pink or purplish. Ovary incompletely 2-celled. Capsule large, broadly ovoid, apiculate. Seeds blackish-brown.—*A. Rich. Fl. Nouv. Zel.* 200; *A. Cunn. Precur.* n. 395; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 183. *Convolvulus Soldanella*, *Linn. Sp. Plant.* 159; *Hook. f. Handb. N.Z. Fl.* 198.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Not uncommon on sandy shores throughout; inland on sandy beaches at Lake Taupo, &c. November–March.

Easily distinguished by the short uniformly prostrate stems, fleshy reniform leaves, and large black seeds. It is a common plant on maritime sands on almost all temperate shores.

4. **C. marginata**, *R. Br. Prodr.* 484. — Rhizome creeping; stems slender, twining, quite glabrous, 2–5 ft. long. Leaves on petioles 1–2 in. long; blade 1–3 in., sagittate, acute or acuminate, membranous; the basal lobes long, acute, diverging, often toothed or lobed. Peduncles usually shorter than the petioles, margined; bracts rounded-ovate, longer than the calyx. Sepals subequal, broadly ovate, obtuse. Corolla small, $\frac{1}{2}$ in. diam., white. Ovary imperfectly 2-celled. Capsule globose; seeds usually 4. — *Hook. f. Fl. Nov. Zel.* i. 184, t. 48. *Convolvulus marginatus*, *Spreng. Syst.* i. 603; *Hook. f. Handb. N.Z. Fl.* 198; *Benth. Fl. Austr.* iv. 430.

NORTH ISLAND: Rare and local. Near Kaitaia, *R. H. Matthews!* between Mongonui and Whangaroa, *T. F. C.*; Whangarei and Owai, *Colenso*; Maungatapu, *H. Carse!* Paparoa, Omaha, and Thames, *Kirk!* Sea-level to 500 ft. December–March. Also in Eastern Australia.

3. CONVULVULUS, Linn.

Herbs or undershrubs, erect or prostrate or climbing. Leaves entire or toothed or lobed. Peduncles axillary, 1- or many-flowered; bracts usually narrow or small. Sepals subequal or the inner narrower. Corolla campanulate; limb plaited, 5-angled or obscurely 5-lobed. Stamens included; filaments filiform, dilated at the base; anthers oblong. Ovary 2-celled, 4-ovuled; style filiform; stigmas 2, distinct, oblong or linear. Capsule globose, 2-celled, 4-valved or splitting irregularly. Seeds glabrous.

A large genus of about 160 species, abundant in most subtropical or temperate countries, less plentiful in the tropics. The single New Zealand species is also found in Australia.

1. **C. erubescens**, *Sims in Bot. Mag.* t. 1067. — Perennial; usually more or less silky-pubescent, rarely almost glabrous. Rootstock stout, creeping; stems few or many, slender, prostrate and trailing, variable in length, 2–12 in. long or more. Leaves petiolate, very variable in size and shape; the lower ones with a blade $\frac{1}{4}$ – $\frac{3}{4}$ in. long, oblong-cordate or hastate, obtuse, quite entire or sinuate; in large specimens gradually passing into much narrower acute or acuminate upper ones, with diverging entire or irregularly toothed basal auricles; in small specimens the narrow cauline leaves are often wanting. Peduncles as long as the leaves or nearly so, 1-flowered, with 2 subulate bracts some distance below the calyx. Sepals broadly oblong, obtuse, silky. Corolla variable in size, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., white. Capsule $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., globose, 2-celled. Seeds 4, rough, brownish-black. — *Hook. f. Fl. Nov. Zel.* i. 185; *Handb. N.Z. Fl.* 198; *Benth. Fl. Austral.* iv. 429.

NORTH ISLAND: Hawke's Bay—Patangata, *H. Tryon!* Wellington—Paliser Bay, *Colenso*, *Buchanan.* SOUTH ISLAND: Marlborough—Waihopai River, *Munro*; Kaikoura Mountains, *Buchanan!* Canterbury—Port Cooper, *Lyall*;

Canterbury Plains, *Armstrong!* *Kirk!* Mackenzie Plains and Lake Tekapo, *T. F. C.* Otago—Not uncommon in the central and eastern districts, *Buchanan!* *Petrie!* Sea-level to 3000 ft. December–March.

A remarkably variable little plant, closely allied to the common *C. arvensis*, L., of the Northern Hemisphere.

4. **DICHONDRA**, Forst.

Small prostrate or creeping perennial herbs. Leaves orbicular-cordate or reniform, entire. Flowers small, solitary, axillary. Sepals subequal, distinct to the base. Corolla broadly campanulate, deeply 5-lobed; lobes induplicate. Stamens shorter than the corolla; filaments filiform; anthers small. Ovary of 2 distinct lobes or carpels, each 1-celled with a basal style and 1 or 2 ovules. Capsules 2, membranous, erect, 1- or rarely 2-seeded, indehiscent or bursting irregularly.

A small genus of 4 or 5 species, widely spread in tropical and subtropical countries.

Leaves $\frac{1}{4}$ –1 in. diam.	Corolla shorter than the calyx or barely equalling it	1. <i>D. repens</i> .
Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in. diam.	Corolla much longer than the calyx	2. <i>D. brevifolia</i> .

1. ***D. repens*, Forst. Char. Gen. 39, t. 20.**—A small silky-pubescent creeping herb; stems slender, 2–12 in. long, rooting at the nodes, branched, often forming broad matted patches. Leaves alternate or tufted at the nodes, usually on long petioles; blade $\frac{1}{4}$ –1 in. diam., reniform, emarginate or rounded at the apex, silky on both surfaces. Peduncles as long or longer than the petioles. Flowers small, greenish-yellow, about $\frac{1}{8}$ in. diam. Sepals obovate, silky. Corolla about equalling the sepals, rarely slightly longer. Capsules enclosed in the persistent calyx and shorter than it.—*Forst. Prodr.* n. 134; *A. Rich. Fl. Nov. Zel.* 201; *A. Cunn. Precur.* n. 397; *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 185; *Handb. N.Z. Fl.* 199; *Benth. Fl. Austral.* iv. 438.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant from the North Cape to Otago. Sea-level to 2500 ft. Spring and early summer.

A widely spread plant in the tropical and subtropical districts of both hemispheres, extending northwards to the United States on one side and China on the other.

2. ***D. brevifolia*, Buch. in Trans. N.Z. Inst. iii. (1871) 208.**—Much smaller and more densely matted than *D. repens*, often forming a compact turf. Leaves on short stout petioles; blade $\frac{1}{8}$ – $\frac{1}{4}$ in. diam., orbicular-oblong or reniform, emarginate or rounded at the apex, cordate at the base, rather thick, silky on both surfaces or almost glabrous. Peduncles stout, erect, usually longer than the leaves. Flowers larger than in *D. repens*, $\frac{1}{4}$ in. diam., yellowish.

Sepals obovate, silky. Corolla much longer than the sepals, sometimes twice as long. Ripe capsules about equalling the calyx.—*D. repens* var. *brevifolia*, *Kirk in Trans. N.Z. Inst.* x. app. xxxvii.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon throughout, ascending to 3000 ft. November–January.

I retain this as a species with considerable hesitation, but it appears to constantly differ from reduced states of *D. repens*, which it otherwise much resembles, in the larger flowers with the corolla always much longer than the calyx.

5. **CUSCUTA**, Linn.

Leafless usually annual herbs, germinating in the soil but not rooting in it, producing filiform branched stems which twine round herbs or shrubs and become parasitic by means of suckers which penetrate the bark. the lower portion of the stem then dying away. Flowers small, usually whitish, in dense or open cymose fascicles, sessile or shortly pedicelled. Sepals 5 or 4, distinct or connate at the base. Corolla campanulate or urceolate or ovoid; lobes 5–4, short, imbricate in the bud. Stamens 5–4, inserted on the throat of the corolla, above a ring of many scale-like lacerate appendages. Ovary globose, 2-celled, 4-ovuled; styles 1 or 2, persistent; stigmas capitate or filiform. Capsule 1–4-seeded, membranous, dry or succulent, circumscissile or bursting irregularly. Seeds glabrous, albuminous; embryo long and slender, spirally coiled; cotyledons wanting or obscure.

A very remarkable genus, comprising about 90 species, spread through most tropical and temperate countries. Some of them, such as the clover dodder, *C. epithymum* var. *trifolii*, are dangerous pests to cultivated crops. The single New Zealand species is very imperfectly known, and may not be truly indigenous.

1. ***C. densiflora***, *Hook. f. Fl. Nov. Zel.* i. 186.—Stems slender, densely matted and twisting together, as thick as stout thread. Flowers crowded in short densely congested 6–10-flowered racemes $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Calyx shortly 5-lobed; lobes oblong, obtuse. Corolla $\frac{1}{8}$ in. long, subcampanulate, marked with transparent oil-glands; lobes 5, short, rounded, recurved. Scales broadly oblong, obtuse, fimbriated, united at their bases by a thin membrane. Filaments longer than the anthers. Styles 2, rather long; stigmas capitate.—*Handb. N.Z. Fl.* 199.

SOUTH ISLAND: Marlborough—Port Underwood, *Lyall*.

I have seen no specimens of this, and the above diagnosis has been drawn up from those given by Hooker in the Flora and the Handbook. According to Hooker, Dr. Engelmann, who examined the type at Kew, reported that it hardly differs from the South American *C. racemosa*, Martius, a species which was introduced into Europe many years ago, and caused much damage to crops of lucerne. It subsequently appeared in fields of lucerne in California. Mr. Kirk (*Trans. N.Z. Inst.* xx. 182) records the occurrence of the same plant (under the synonym of *C. hassiaca*, Pfeiff.) in lucerne-fields in Canterbury, but there are no specimens in his herbarium.

C. novæ-zealandiæ, T. Kirk in Trans. N.Z. Inst. xx. (1899) 183 (name only).—After a careful examination of the type specimens in Mr. Kirk's herbarium, I have no hesitation in referring this to the northern *C. epithymum*, Linn., which has been observed in many localities in the colony, and which often associates itself with the indigenous vegetation.

ORDER LIII. SOLANACEÆ.

Herbs or shrubs, rarely small trees. Leaves alternate, often in unequally placed pairs, but never truly opposite, entire or lobed or pinnate; stipules wanting. Flowers regular or occasionally slightly irregular, hermaphrodite, solitary or cymose; bracts wanting. Calyx inferior, persistent, 4-5-toothed or -lobed. Corolla gamopetalous, hypogynous, 4-5-toothed or -lobed, campanulate or funnel-shaped or rotate, often plicate. Stamens 4-5, inserted on the tube of the corolla and alternate with its lobes; anthers free or conniving, dehiscing lengthwise or by apical pores. Ovary superior, 2-celled, rarely incompletely 4-celled; style terminal, simple; stigma entire or 2-lobed; ovules numerous, amphitropous, on prominent peltate placentas attached to the middle of the septum. Fruit a berry or capsule, usually 2-celled, many-seeded. Seeds small, compressed or reniform; albumen copious; embryo terete, curved or almost spiral, radicle next the hilum.

A large and widely diffused family, most numerous in the tropics, but extending northwards and southwards into most temperate regions. Genera between 60 and 70; species variously estimated, probably considerably over 1000. The order must be considered a dangerous one, from the large number of species containing narcotic and poisonous principles, as the deadly nightshade, henbane, tobacco, stramonium, &c. A few species are simply tonic and bitter, while others are pungent and stimulant, as the various kinds of capsicums. But, notwithstanding the generally suspicious character of the order, it nevertheless furnishes one of the chief articles of vegetable food in the potato, and also includes the tomato, egg-plant, and cape gooseberry. Among garden plants the genera *Petunia*, *Salpiglossis*, *Cestrum*, and *Datura* are the most noteworthy. The sole New Zealand genus is almost cosmopolitan.

1. *SOLANUM*, Linn.

Herbs or shrubs or small trees, unarmed or spinous. Leaves alternate, often in pairs, a smaller one being developed in the axil of the larger one, entire or irregularly toothed or divided. Flowers solitary or more frequently in short racemes or cymes, lateral or terminal. Calyx 5-10-lobed or -partite. Corolla rotate or shortly campanulate; tube short; limb 5-10-lobed, plaited. Stamens 5, inserted on the throat of the corolla, exserted; filaments short; anthers oblong or linear, erect and connivent into a cone around the style, opening by 2 terminal pores. Ovary 2-celled, rarely 3-4-celled; style simple; stigma small; ovules numerous. Fruit a small or large 2-celled many-seeded berry. Seeds numerous, discoid or reniform.

An immense genus, abundant in all tropical countries and especially in tropical America, rarer in temperate regions. Species probably over 800.

Herbaceous, 1-3 ft. high. Leaves ovate. Flowers small,
 $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. 1. *S. nigrum*.
 Shrubby, 4-8 ft. high. Leaves lanceolate, often pinnati-
 fid. Flowers large, $\frac{3}{4}$ in. diam. 2. *S. aviculare*.

S. sodomæum, Linn., a spinous species with stellate pubescence, pinnatifid leaves, and rather large globose yellow berries, has become naturalised many localities between the North Cape and Tauranga. So also has *S. auriculatum*, Ait., an unarmed densely woolly species with large leaves furnished with a pair of roundish auricles near the base of the petioles. The common potato (*S. tuberosum*, Linn.) often lingers for a time in places where it has been cultivated.

1. *S. nigrum*, Linn. *Sp. Plant.* 186.—Erect, herbaceous from a somewhat woody base, glabrous or pubescent, 1-3 ft. high; branches spreading, angular, the angles sometimes minutely tuberculate. Leaves on slender petioles; blade $1\frac{1}{2}$ -3 in. long, ovate or ovate-rhomboid, acute or acuminate, narrowed into the petiole, entire or coarsely and irregularly toothed, membranous. Flowers small, white, drooping, $\frac{1}{3}$ in. diam., in small umbellate 5-8-flowered cymes; peduncles slender, supra-axillary. Calyx 5-lobed to the middle. Corolla deeply 5-lobed. Berry $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., globose, black or red. *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 182; *Handb. N.Z. Fl.* 200; *Benth. Fl. Austral.* iv. 446.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Not uncommon as far south as central Otago. Sea-level to 2000 ft. A common weed in almost all parts of the world.

2. *S. aviculare*, Forst. *Prodr.* n. 107.—A leafy unarmed soft-wooded bush or shrub 4-8 ft. high, perfectly glabrous in all its parts; branches spreading, smooth or marked with raised lines decurrent from the petioles. Leaves alternate, petiolate, very variable in size and shape, 4-12 in. long or even more, lanceolate or linear-lanceolate and entire, or irregularly pinnatifidly lobed with 1-3 spreading lanceolate acute lobes on each side, membranous, glabrous, main veins spreading at right angles. Cymes 1-3 in the axils of the upper leaves or lateral, shorter than the leaves, few- or many-flowered. Flowers $\frac{3}{4}$ -1 in. diam., purplish or white. Calyx-lobes short, broad, obtuse. Corolla shortly and broadly 5-lobed. Filaments as long as or longer than the anthers; anthers oblong, spreading, opening at the tips by transverse slits which are usually continued down the sides. Berry broadly ovoid, $\frac{3}{4}$ -1 in. long, drooping, yellowish.—*A. Rich. Fl. Nouv. Zel.* i. 193; *Hook. f. Fl. Nov. Zel.* i. 182; *Handb. N.Z. Fl.* 200; *Benth. Fl. Austral.* iv. 447. *S. laciniatum*, Ait. *Hort. Kew*, ed. 1, 247; *A. Cunn. Precur.* n. 386; *Raoul, Choix*, 43.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in lowland districts as far south as Foveaux Strait. *Poporo*; *Poroporo*; *Kohoho*. Flowers most of the year.

Also common in many parts of Australia and Tasmania, and in Norfolk Island. The fruit is edible, and was made into jam by the early colonists.

ORDER LIV. SCROPHULARINEÆ.

Herbs or shrubs, rarely small trees. Lower leaves usually opposite, upper alternate, or all opposite or all alternate; stipules wanting. Flowers generally irregular, hermaphrodite. Calyx inferior, persistent, 4-5-toothed or -lobed, sometimes of 5 free sepals. Corolla gamopetalous, hypogynous, commonly 2-lipped but sometimes almost regular, 4-5-lobed; lobes imbricate in bud. Stamens inserted on the tube of the corolla, either 2, or 4 in 2 pairs, 2 long and 2 short (didynamous), sometimes the rudiment of a fifth stamen is present or rarely all five are present and perfect; anthers 1-2-celled, cells distinct or confluent. Ovary superior, 2-celled; style simple; stigma entire, 2-lobed or 2-lamellate; ovules usually numerous in each cell, anatropous or amphitropous, placentas affixed to the septum. Fruit a 2-celled many-seeded capsule, rarely an indehiscent berry. Seeds small, generally numerous, various in form; albumen fleshy, seldom wanting; embryo straight or rarely curved.

A large order, scattered over the whole world, but far better represented in temperate regions or in mountainous districts than in very warm climates. Genera about 160; species estimated at 2000. The medicinal properties of the order are very various. A few species are purgative, others are astringent or tonic, a far greater number are acrid and bitter or even poisonous. The fox-glove (*Digitalis*) is the only one largely used medicinally, although many others are occasionally employed. The family contains many handsome garden-plants, especially of the genera *Calceolaria*, *Antirrhinum*, *Pentstemon*, *Mimulus*, *Digitalis*, and *Veronica*. Of the 11 genera found in New Zealand, 2, *Anagosperra* and *Siphonidium*, are endemic; *Calceolaria* occurs elsewhere only in South America; *Ourisia* is also mainly South American, but extends to Tasmania as well; *Glossostigma* is confined to Australia and New Zealand. The remaining 6 have a wide distribution in both temperate and tropical regions.

4. *Antirrhinidæ*. Upper lip (or two upper lobes) of the corolla always outside the others in bud.

* Stamens 2.

Calyx 4-partite. Corolla 2-lipped, lips inflated ..	1. CALCEOLARIA.
Calyx 5-partite. Corolla 2-lipped, lips not inflated ..	4. GRATIOLA.

** Stamens 4.

Flowers axillary in the New Zealand species. Calyx 5-angled and -toothed. Corolla 2-lipped. Stigma 2-lamellate ..	2. MIMULUS.
Flowers in terminal racemes. Calyx 5-partite, not angled. Corolla 2-lipped. Stigma 2-lamellate ..	3. MAZUS.
Flowers axillary, solitary. Calyx 3-4-lobed. Corolla nearly regular. Stigma spatulate ..	5. GLOSSOSTIGMA.
Flowers axillary. Calyx 5-toothed. Corolla rotate. Stigma clavate ..	6. LIMOSELLA.

B. Rhinanthideæ. Under-lip or lateral lobes of the corolla covering the upper in bud.

* Stamens 2.

Shrubs or herbs. Leaves opposite, often imbricate and quadrifarious in the New Zealand species. Corolla rotate or tube short; limb 4-lobed or rarely 5-lobed .. 7. VERONICA.

** Stamens 4.

Corolla 5-lobed, campanulate or nearly so, tube short.
 Stigma capitate 8. OURISIA.
 Corolla 2-lipped, tube short. Ovary usually with several ovules in each cell, rarely reduced to two .. 9. EUPHRASIA.
 Corolla 2-lipped, tube long. Ovary with one ovule in each cell .. 10. ANAGOSPERMA.
 Corolla 2-lipped, tube exceedingly long, gibbous, upper lip entire. Stigma 2-lobed .. 11. SIPHONIDIUM.

1. CALCEOLARIA, Linn.

Herbs or small shrubs. Leaves opposite or whorled, rarely alternate. Flowers in axillary or terminal few- or many-flowered cymes or panicles, rarely solitary. Calyx inferior or slightly adherent to the base of the ovary, 4-partite; segments valvate. Corolla-tube very short or almost wanting; limb 2-lipped; lips nearly equal and both inflated in the New Zealand species, but in the majority of the American ones the upper lip is small, rounded, and entire, and the lower large, much inflated, and slipper-shaped. Stamens 2, lateral, affixed near the base of the corolla; anthers 2-celled. Ovary 2-celled; ovules numerous in each cell; style simple; stigma minute. Capsule ovoid-conic, septicidally 2-valved; valves 2-fid. Seeds numerous, striate.

A large genus of about 135 species, with the exception of the two species found in New Zealand purely American, stretching along the chain of the Andes from the Straits of Magellan to Colombia and Mexico.

Stems erect. Leaves ovate, 1-3 in. long. Panicles usually many-flowered .. 1. *C. Sinclairii*.
 Stems creeping. Leaves broadly ovate or orbicular, $\frac{1}{2}$ -1 in. long. Panicle 1-5-flowered .. 2. *C. repens*.

1. *C. Sinclairii*, Hook. *Ic. Plant.* t. 561.—More or less glandular-pubescent in all its parts. Stems slender, erect, laxly branched, 6-18 in. high. Leaves opposite, on slender petioles 1-3 in. long; blade 1-3 in., ovate or elliptic-ovate, obtuse or subacute, obliquely rounded or almost cordate at the base, coarsely crenate-toothed or -lobed, the lobes again toothed, membranous, pubescent on both surfaces, paler below. Panicles terminal, branched, few- or many-flowered; pedicels slender. Flowers small, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam., white or yellow spotted with purple. Calyx-lobes small, deltoid, acute. Corolla pubescent, divided about $\frac{1}{3}$ -way down into 2 nearly equal concave lips, the upper lip but slightly smaller. Stamens on very

short filaments; anthers orbicular. Capsule $\frac{1}{8}$ in. long.—*Raoul*, *Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 187; *Handb. N.Z. Fl.* 201; *Bot. Mag.* t. 6597. *C. albula* and *C. Sturmi*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 391, 392.

NORTH ISLAND: Hicks Bay and the East Cape to Hawke's Bay and the Ruahine Mountains, *Sinclair*, *Colenso*! *Bishop Williams*! *Adams* and *Petrie*! &c. November–February.

2. *C. repens*, *Hook. f. Fl. Nov. Zel.* i. 187.—A slender much-branched creeping and rooting pubescent herb, stems 4–12 in. long; branches very slender, prostrate or ascending, sparingly leafy. Leaves opposite, on long slender petioles; blade $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, broadly oblong or ovate to orbicular, coarsely and irregularly doubly toothed or crenate, very thin and membranous, sparingly pubescent on both surfaces. Panicles terminal, small, 1–5-flowered; pedicels almost filiform. Flowers about $\frac{1}{4}$ in. diam., white spotted with purple. Calyx adherent to the ovary at the base; lobes ovate, acute. Corolla divided about half-way down into two nearly equal concave entire lips, upper lip slightly smaller. Capsule ovoid-conic, membranous.—*Handb. N.Z. Fl.* 202.

NORTH ISLAND: East Cape and Poverty Bay, *Bishop Williams*! ravines at the base of the Ruahine Range, *Colenso*! Mount Egmont, *Buchanan*! source of the Patea River, *T. F. C.*; Rimutaka Range, *Kirk*! *Wainuiomata*, *T. P. Arnold*. SOUTH ISLAND: Nelson—Cedar Creek and valley of the Lyell, *W. Townson*! Westland—Otira and Teremakau Valleys, *Petrie*! *Cockayne*! 250–2000 ft. December–February.

2. *MIMULUS*, Linn.

Erect or prostrate herbs. Leaves opposite, entire or toothed. Flowers solitary and axillary, or the upper ones sometimes forming a terminal raceme. Calyx tubular or campanulate, 5-angled, 5-toothed. Corolla tubular at the base, 2-lipped above; upper lip erect or spreading, 2-lobed; lower spreading, 3-lobed; throat usually with two protuberances. Stamens 4, didynamous; anthers all perfect, 2-celled; cells divergent, often confluent at the top. Style slender; stigma of 2 flat laminæ. Capsule loculicidally dehiscent, valves usually splitting away from a central column which bears the placentas. Seeds small, numerous.

A genus of about 50 species, most numerous in western America, found more sparingly in eastern and tropical Asia, South Africa, and Australia; not known in Europe in the wild state. The single New Zealand species extends to Australia and Tasmania.

M. repens, *R. Br. Prodr.* 439.—Perfectly glabrous. Stems stout, succulent, creeping and rooting at the joints; branches prostrate or ascending or erect, 1–5 in. long. Leaves opposite, sessile, often stem-clasping, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, broadly ovate to oblong, obtuse, quite entire, thick and succulent, pitted when dry. Flowers few,

axillary and solitary; peduncles stout, usually shorter than the leaves. Calyx broadly funnel-shaped or almost obconic, truncate at the mouth, minutely toothed. Corolla variable in size, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., white with a yellow throat; tube dilated upwards, much longer than the calyx; lobes broad, rounded. Capsule broadly oblong, obtuse, enclosed in the calyx, about $\frac{1}{4}$ in. long.—*Hook. f. Fl. Nov. Zel.* i. 188; *Handb. N.Z. Fl.* 202; *Bot. Mag.* t. 5423; *Benth. Fl. Austral.* iv. 482. *M. Colensoi*, *Kirk in Trans. N.Z. Inst.* iii. (1871) 179.

NORTH AND SOUTH ISLANDS: Salt marshes from the North Cape to the south of Otago, not common. November–January.

Mr. Kirk's *M. Colensoi* is a form with erect sparingly divided branches, but it does not otherwise differ from the type. The species is common in many parts of Australia and Tasmania.

3. MAZUS, Lour.

Small herbs, often prostrate and creeping. Lower leaves opposite or rosulate, upper ones when present often alternate. Flowers in terminal subsecund racemes or solitary. Calyx campanulate, 5-partite, not angled. Corolla-tube short; upper lip erect, 2-fid; lower larger, spreading, 3-fid; throat with 2 protuberances. Stamens 4, didynamous; anther-cells divergent, often confluent at the tip. Style slender; stigma 2-lamellate. Capsule loculicidally dehiscent, valves entire. Seeds numerous, very minute, ovoid.

A small genus of 6 or 7 species, extending northwards through Australia to the Malay Archipelago, India, and China. One of the New Zealand species is found in Australia and Tasmania, and is very closely allied to the Indian *M. rugosus*; the other is endemic.

Slender. Leaves $\frac{3}{4}$ –3 in., linear-obovate or obovate-spathulate, membranous. Flowers small, about $\frac{1}{2}$ in. long .. 1. *M. pumilio*.
 Stout. Leaves $\frac{1}{2}$ –2 in., obovate or oblong. Flowers large, $\frac{3}{4}$ in. long 2. *M. radicans*.

1. *M. pumilio*, *R. Br. Prodr.* 439.—A small perennial herb with a creeping underground stem, putting up short leafy branches. Leaves close together, forming an erect tuft, variable in size, $\frac{3}{4}$ –3 in. long including the petiole, obovate-spathulate, obtuse, gradually narrowed into the petiole, membranous, entire or irregularly sinuate-toothed, glabrous or sparingly pilose. Peduncles slender, usually exceeding the leaves, 1–6-flowered; pedicels long, each with a linear-setaceous bract. Calyx narrow-campanulate; lobes narrow, acute. Corolla $\frac{1}{4}$ – $\frac{1}{2}$ in. long, white or blueish-white with a yellow centre; tube exceeding the calyx; lobes broad, rounded. Capsule included in the persistent calyx.—*Hook. Ic. Plant.* t. 567; *Hook. f. Fl. Nov. Zel.* i. 189; *Handb. N.Z. Fl.* 202; *Benth. Fl. Austral.* iv. 484.

NORTH ISLAND: Auckland — Ahipara, *T. F. C.*; Matapouri, *Colenso*! Lower Waikato, *T. F. C.*, *Petrie*! *Carse*! Thames River, *Adams*; East Cape, *Bishop Williams*! Wellington — Manawatu River, *Colenso*! Otaki, *Buchanan*! Pencarrow Lagoon, *Kirk*! SOUTH ISLAND: Canterbury — Banks Peninsula, *Lyll*; Canterbury Plains, *Haast*! *Armstrong*. November–February.

2. *M. radicans*, *Cheesem.*—Stems creeping and rooting at the joints, often subterranean, putting up short erect leafy branches 1–3 in. high. Leaves close together, spreading, petiolate, $\frac{3}{4}$ –2 in. long including the petiole, obovate or linear-obovate, obtuse, gradually narrowed into the petiole, entire or very obscurely sinuate, pilose or almost glabrous. Peduncle terminal, 1–3-flowered, usually longer than the leaves; pedicels with 1 or 2 linear-subulate bracts. Flowers large, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, white with a yellow centre. Calyx campanulate, 5-cleft, not angled, pilose with jointed hairs. Corolla-tube much exceeding the calyx; upper lip erect; lower lip much larger, spreading. Capsule $\frac{1}{3}$ in. long, ovoid, enclosed in the persistent calyx.—*Mimulus radicans*, *Hook. f. Fl. Nov. Zel. i.* 188; *Handb. N.Z. Fl.* 202.

NORTH ISLAND: Wellington—Head of the Wairarapa Valley and Tararua Mountains, *Colenso*! *Buchanan*! SOUTH ISLAND: Not uncommon throughout in wet places in mountain districts. 500–3500 ft. November–February.

Imperfect specimens of this were described by Sir J. D. Hooker as a *Mimulus*. It has, however, the habit, inflorescence, and calyx of *Mazus*, and I have consequently transferred it to that genus.

5. *GRATIOLA*, Linn.

Herbs, glabrous or glandular-pubescent. Leaves opposite, entire or toothed. Flowers axillary and solitary, 2-bracteolate. Calyx deeply 5-partite; segments nearly equal. Corolla-tube cylindric; lips spreading, upper entire or 2-fid, lower 3-fid. Perfect stamens 2, included; anther-cells distinct, parallel; staminodia or barren stamens 2, filiform, sometimes wanting. Style filiform; stigma dilated and deflexed, entire or 2-lamellate. Capsule ovoid, loculicidally or septicidally dehiscent, 4-valved, valves separating from a columnar placentiferous axis. Seeds numerous, small, reticulate.

A genus consisting of about 25 species, scattered over the temperate and subtropical portions of both hemispheres. One of the New Zealand species has a wide range in Australia and extra-tropical South America; the other extends to Victoria and Tasmania alone.

Suberect, usually glabrous. Leaves $\frac{1}{4}$ – $\frac{3}{4}$ in. long .. 1. *G. peruviana*.
Procumbent, usually glandular-pilose. Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in. .. 2. *G. nana*.

1. *G. peruviana*, Linn. *Sp. Plant.* 17.—Stems stout, glabrous or slightly viscid-pubescent, laxly branched, ascending or suberect from a decumbent or almost prostrate base, 3–12 in. high. Leaves opposite, sessile, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, ovate or ovate-lanceolate or oblong, dis-

tantly and sometimes obscurely serrate, usually 3-nerved. Flowers in the axils of the leaves; peduncles very short, sometimes almost wanting. Calyx-segments lanceolate, acuminate. Corolla $\frac{1}{3}$ – $\frac{1}{2}$ in. long, white or yellowish-white with a yellow throat, the lips broad, much shorter than the tube. Anthers connivent; cells transverse, parallel. Staminodia filiform, elongated. Capsule ovoid-globose, $\frac{1}{5}$ in. long, membranous.—*Benth. Fl. Austral.* iv. 493. *G. sexdentata*, *A. Cunn. Precur.* n. 383; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 189; *Handb. N.Z. Fl.* 203. *G. latifolia*, *R. Br. Prodr.* 435; *Kirk in Trans. N.Z. Inst.* iii. (1871) 165. *G. glandulifera*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 245.

NORTH ISLAND: Common in lowland swamps throughout. SOUTH ISLAND: Nelson—Buller Valley; Charleston, *Townson!* Otago—Lake Te Anau, *Petrie*. Sea-level to 1500 ft. November–February.

Also common in Australia and Tasmania, and in many parts of extra-tropical South America.

2. *G. nana*, *Benth. in D.C. Prodr.* x. 404.—Stems procumbent or creeping, much branched, often matted, 2–8 in. long, usually more or less clothed with jointed glandular hairs, but sometimes almost glabrous; branches ascending at the tips. Leaves sessile or very shortly petiolate, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, broad or narrow-oblong or obovate, obtuse or subacute, narrowed at the base, obtusely toothed, glabrous or glandular-pilose. Flowers few, on short peduncles. Calyx glandular-pilose; segments often toothed. Corolla $\frac{1}{4}$ – $\frac{1}{3}$ in. long, white or white with pinkish veins, throat yellow; lobes short, rounded. Anthers connivent; cells transverse, parallel. Staminodia filiform, elongated. Capsule broadly ovoid.—*Handb. N.Z. Fl.* 203; *Benth. Fl. Austral.* iv. 493. *G. pubescens*, *Hook. f. Fl. Nov. Zel.* i. 189 (not of *R. Br.*). *G. concinna*, *Col. in Trans. N.Z. Inst.* xix. (1887) 264.

NORTH ISLAND: Auckland—Bay of Islands, *R. Cunningham* (Handbook); swamps between the Manukau Harbour and Waikato River, *Carse!* Hawke's Bay—Norsewood, *Colenso!* Taranaki—Ngairu Swamp, *Kirk!* SOUTH ISLAND: From Nelson to Southland, but not common. Sea-level to 2500 ft. November–February.

Apparently a variable little plant. South Island specimens are stouter and more densely leafy, and have larger flowers than those from the North Island. Also found in Victoria and Tasmania.

5. GLOSSOSTIGMA, Arn.

Very small perfectly glabrous creeping and rooting herbs. Leaves opposite or fascicled at the nodes, quite entire. Flowers minute, axillary, solitary, ebracteolate. Calyx campanulate, shortly and obtusely 3–4-lobed. Corolla-tube short; lobes 5, nearly equal. Stamens 2 or 4, affixed to the corolla-tube; filaments filiform; anther-cells diverging at the base, confluent at the top. Ovary perfectly or imperfectly 2-celled; style short, dilated upwards into

a broad and thin spoon-shaped stigmatic lamina which usually curves over the stamens. Capsule globular or ovoid, included in the persistent calyx, loculicidally 2-valved; valves entire, separating from a central placentiferous axis. Seeds small, ovoid.

In addition to the two species found in New Zealand, one of which extends to Australia, there are two others in Australia, one of them found also in tropical Asia and Africa.

Forming broad matted patches. Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in., linear-ovate. Flowers $\frac{1}{10}$ – $\frac{1}{8}$ in. diam. Stamens 4 .. 1. *G. elatinoides*.
Minute, very slender, matted. Leaves $\frac{1}{12}$ – $\frac{1}{8}$ in., linear or narrow linear-spathulate. Flowers very minute, $\frac{1}{20}$ in. diam. Stamens 2 2. *G. submersum*.

1. *G. elatinoides*, Benth. in Hook. f. *Fl. Nov. Zel.* i. 189.—A small creeping intricately branched moss-like plant, forming dense matted patches 2–6 in. across or more; stems slender, rooting at the nodes, rarely suberect at the tips. Leaves opposite, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear-spathulate or linear-ovate, obtuse, gradually narrowed into a petiole equalling the blade. Peduncle at first shorter than the leaves, but often elongating after flowering. Flowers minute, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam., white. Calyx with 4 short obtuse lobes. Corolla-tube shorter than the calyx; lobes rounded, obtuse, fringed with minute cilia. Stamens 4, included. Style short; stigma very large, spoon-shaped, irritable. Capsule small, ovoid-globose.—Hook. f. *Handb. N.Z. Fl.* 203; Benth. *Fl. Austral.* iv. 502. *Tricholoma elatinoides*, Benth. in D.C. *Prodr.* x. 426. *Lobelia submersa*, A. Cunn. *Precur.* n. 424.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in lakes and marshes from the North Cape southwards, often entirely submerged. Sea-level to 2500 ft. November–February.

Also found in south-eastern Australia and Tasmania. For an account of the fertilisation, see a paper by myself in *Trans. N.Z. Inst.* x. 353.

2. *G. submersum*, Petrie in *Trans. N.Z. Inst.* xxiii. (1891) 401.—A minute very slender intricately branched plant, forming small but dense matted patches; stems creeping and rooting at the nodes. Leaves opposite or fascicled, $\frac{1}{12}$ – $\frac{1}{4}$ in. long, linear or narrow linear-spathulate, quite entire, gradually narrowed into a petiole equalling the blade or rather shorter than it. Peduncles slender, axillary, about as long as the leaves. Flowers very minute, $\frac{1}{20}$ in. diam. Calyx obtusely 3-lobed. Corolla small, not much longer than the calyx; lobes short, rounded. Stamens 2, included. Capsule not exceeding the calyx, globose, $\frac{1}{15}$ in. diam.

SOUTH ISLAND: Otago—Tidal shores of Lake Waihola, usually submerged at high water, Petrie!

A very curious little plant, apparently closely allied to the Queensland *G. spathulatum*, Arn., but my flowering specimens are insufficient for a proper comparison.

6. **LIMOSELLA**, Linn.

Small tufted creeping glabrous marsh or aquatic plants. Leaves opposite or fasciated at the nodes, rarely alternate on barren shoots, long-petioled, linear or spathulate, quite entire. Flowers minute, axillary, solitary. Calyx campanulate, 5-toothed or -lobed. Corolla campanulate or almost rotate; tube short; lobes 5, nearly equal. Stamens 4; filaments filiform; anther-cells confluent. Ovary 2-celled at the base; style short; stigma clavate or subcapitate. Capsule obscurely dehiscent or septicidally 2-valved; valves thin, membranous. Seeds numerous, small, ovoid, transversely rugulose.

A genus comprising 6 or 7 species, found in most parts of the world.

- | | |
|---|---------------------------|
| Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long; lamina not much broader than the petiole. Flowers pedicelled; corolla and capsule longer than the calyx | 1. <i>L. tenuifolia</i> . |
| Leaves 2-5 in. long; lamina ovate, suddenly contracted into the slender petiole. Flowers sessile; corolla and capsule shorter than the calyx | 2. <i>L. Curdieana</i> . |

1. ***L. tenuifolia***, Nutt. *Gen. N. Amer.* ii. 43.—Annual or perennial, creeping and tufted, often forming patches 1-2 in. diam. or more. Leaves densely fasciated, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, rarely more, narrow-linear or linear-subulate, often with little or no distinction between petiole and blade, but sometimes dilated towards the tip and becoming narrow linear-spathulate. Flowers minute, $\frac{1}{12}$ in. diam., axillary, on very short pedicels. Calyx 5-toothed. Corolla rather longer than the calyx; lobes ovate-oblong. Capsule ovoid-globose, exceeding the calyx when mature.—*L. australis*, R. Br. *Prodr.* 443. *L. aquatica* var. *tenuifolia*, Hook. f. *Fl. Nov. Zel.* i. 190; *Handb. N.Z. Fl.* 204. *L. ciliata*, Col. in *Trans. N.Z. Inst.* xxi. (1889) 96.

NORTH AND SOUTH ISLANDS: Common in wet places throughout. Sea-level to 3000 ft. November-February.

Often considered to be a variety of the widely diffused *L. aquatica*, Linn., but the leaves have not the conspicuous lamina of that species, and the whole plant is usually much smaller. It also occurs in Australia and Tasmania, in temperate North and South America, and in some parts of Europe.

2. ***L. Curdieana***, F. Muell. *Fragm. Phyt. Austral.* ix. 166.—A perennial herb with tufts of radical leaves, emitting short thick stolons terminating in other tufts, glabrous in all its parts. Leaves numerous; petiole 2-4 in. long or more, filiform, terete, dilated towards the base; blade $\frac{1}{4}$ - $\frac{3}{4}$ in. long, ovate or ovate-oblong, obtuse, suddenly contracted into the petiole, rather thin; main veins 3-5, parallel, with reticulating veinlets between. Flowers crowded at the bases of the petioles, sessile, minute. Calyx $\frac{1}{10}$ in. long or less, tipped with 5 minute teeth. Corolla altogether included in the

calyx, shortly 5-lobed. Stamens 4, inserted on the corolla-tube. Style short; stigma capitate. Capsule included within the persistent calyx, $\frac{1}{10}$ — $\frac{1}{8}$ in. diam., globose, rupturing irregularly. Seeds very numerous; testa reticulated.

SOUTH ISLAND: Otago—Watery places in the Manuherikia Valley, *Petrie*. Also in Australia.

A very curious plant, differing from all states of *L. aquatica* in the sessile flowers, included corolla, and capsule shorter than the calyx. I have seen no specimens except Mr. *Petrie's*, the flowers of which appear to be cleistogamic.

7. VERONICA, Linn.

Herbs or shrubs, rarely small trees. Leaves opposite or rarely the cauline alternate, often connate at the base, large or small and scale-like, spreading or appressed, often closely quadrifariouly imbricate. Flowers in bracteate axillary or terminal racemes, more rarely in spikes or panicles or corymbs, sometimes solitary in the axils of the leaves or terminal. Calyx usually 4-partite, rarely 3- or 5-partite. Corolla-tube longer or shorter than the calyx, sometimes very short; limb spreading, usually 4-lobed, sometimes 5-lobed, seldom 3- or 6-lobed; lobes unequal or rarely equal, imbricate in the bud, the lateral ones or one of them outside. Stamens 2, very rarely 4 or 5; filaments long or short, inserted on the corolla-tube; anther-cells diverging or parallel, confluent at the tip. Ovary small, 2-celled; style slender; ovules few or many in each cell. Capsule 2-celled, compressed or turgid, grooved on each side, either septicidally dehiscent with the placentas separating, or loculicidal with the valves remaining attached to the undivided placental column or separating from it. Seeds few or many, ovate or orbicular, compressed, attached by the inner flat surface.

A genus of nearly 200 species, most abundant in New Zealand and in the temperate regions of the Northern Hemisphere, rare and almost absent in the tropics. In New Zealand it is by far the largest genus of flowering-plants, and in montane or subalpine districts forms a conspicuous portion of the vegetation. Many of the species are singularly beautiful in form, foliage, and flower; and from that reason, and from the ease with which they can be cultivated, a considerable number have become well established in gardens throughout the colony and in Europe. Of the 84 species admitted in this book, all but three are endemic. These are *V. elliptica*, which is found in the Falkland Islands, Fuegia, and South Chili; *V. plebeia*, which is not uncommon in east Australia; and *V. Anagallis*, which has a wide distribution in the north temperate zone. But the last is probably an introduction. The distribution of the species within the colony is peculiar. Fourteen are confined to the North Island, and no less than 55 to the South Island, while only 11 species are found in both Islands. Three are endemic in the Chatham Islands, and one in the Auckland and Campbell Islands. Of the 84 species, 49 are purely montane or alpine, not one of them descending below 1000 ft. altitude; 13 are both lowland and montane; 12 are purely lowland, but do not evince any special predilection for the sea-coast; while 10 are never seen far from the sea.

Veronica presents great difficulties to the systematist. Many of the species are singularly protean in habit, foliage, and inflorescence, varying so much in appearance that it is no easy matter to fix their real limits. Intermediate forms are numerous, connecting species that would otherwise appear most distinct, and in not a few cases these intermediates blend so freely into one another that an apparently continuous series of forms is produced, while several species hybridise so readily in cultivation that the supposition at once arises that natural hybrids may also occur. So great has been the difficulty in deciding what are the limits of the species, and in properly characterizing them, that the late Baron Mueller, in his little book on the vegetation of the Chatham Islands, boldly proposed to solve the question by referring no less than 13 of the species considered to be distinct by Hooker to a collective species to which he gave the new name of *V. Forsteri*! It is hardly necessary to say that this extreme view has not received the sanction of any botanist familiar with the vegetation of the colony.

Two papers of considerable importance dealing with the New Zealand species have appeared since the publication of the Handbook. The first is Mr. Armstrong's "Synopsis of the New Zealand Species of *Veronica*" (Trans. N.Z. Inst. xiii. 344). This is mainly based on observations made during the author's explorations in the Alps of Canterbury, and on the study of the fine collection of living plants which he had amassed in the Christchurch Botanical Gardens. It contains descriptions of a considerable number of new species, and many observations of value. Unfortunately, Mr. Armstrong did not distribute types of his new species, so that in some cases their identification is uncertain. The second is Mr. Kirk's "Notes on certain *Veronicas*" (Trans. N.Z. Inst. xxviii. 515). In this Mr. Kirk transfers to the genus those species which had been erroneously placed in *Logania* and *Mitrasacme* by previous authors. Descriptions are also given of five or six new forms, in addition to much new matter bearing on the geographical distribution, &c., of the species already known. Another contribution of considerable value consists of the coloured drawings and descriptions published from time to time by Sir J. D. Hooker in the *Botanical Magazine*. Altogether, about 20 species have been beautifully illustrated and described by him, the value of the descriptions being enhanced by the critical notes which accompany them. Since the publication of the Handbook, too, the important fact has been made known by Kirk and others that the whole of the species with minute scale-like leaves (answering to Section III. of the following conspectus) have dimorphic foliage, the leaves of the young state being widely different from those of the mature plant. It has also been shown that these early leaves are often produced by reversion on old specimens, especially when cultivated in a cool and moist situation. The student will find the early leaves of several species fully described in the excellent series of papers on the "Seedling Forms of New Zealand Phænogams," contributed by Mr. Cockayne to the recent volumes of the Transactions of the New Zealand Institute.

I have followed the "Genera Plantarum" and Engler and Prantl's "Natürlichen Pflanzenfamilien" in reducing Hooker's genus *Pygmea* to *Veronica*, the differences of a 5- or 6-lobed corolla and leaves not quadrifariouly arranged hardly being of generic importance, especially now that it is known that several true *Veronicas* have a 5-lobed corolla. The arrangement and limitation of the species, and the preparation of the necessary diagnoses, has proved to be a most difficult and perplexing task, and I am far from satisfied with the result. But, imperfect though it may be, it represents many months' assiduous study, and the examination of some thousands of specimens, and is, at any rate, an honest effort to clear away some of the difficulties which have hitherto impeded the study of the genus. I have to acknowledge the great assistance rendered to me by Mr. N. E. Brown, of the Kew Herbarium, in comparing sets of my specimens with the types preserved at Kew, and for many full and valuable notes thereon.

Students using the conspectus should bear in mind that the characters employed are in many cases arbitrary ones selected to show how the dominant forms of a certain species differ from those of another species, and do not always include the entire range of variation of a species. Plants like *V. salicifolia*, *macrocarpa*, *parviflora*, *Traversii*, *buxifolia*, *pinguifolia*, &c., which run into numberless varieties, are probably quite incapable of rigid definition.

It should be mentioned that several species from the Northern Hemisphere have become naturalised in New Zealand, the most abundant being *V. serpyllifolia*, *V. arvensis*, *V. agrestis*, and *V. persica*. Descriptions of these will be found in any British Flora.

DIVISION I., HEBE. Capsule turgid or dorsally compressed, the septum across the broadest diameter. Erect or decumbent shrubs from a few inches to 12 or 15 ft. high, more rarely becoming small trees 20–25 ft. high. Flowers in axillary racemes or spikes, more rarely corymbose, very rarely solitary.

SUBDIVISION A. Leaves quite entire (sometimes minutely incised in *V. salicifolia*, *amabilis*, *diosmæfolia*, *Colensoi*, and others; occasionally toothed in *V. Haastii*).

Section I. Large shrubs or small trees. Leaves 1–6 in. long, broad or narrow, lax, spreading, not imbricating. Racemes simple, longer than the leaves many-flowered.

* Leaves obovate to oblong-lanceolate or lanceolate, usually more than $\frac{1}{2}$ in. broad (sometimes less in *V. divergens*, *ligustrifolia*, and *chathamica*).

- | | |
|--|------------------------------|
| Leaves $2-4 \times 1-1\frac{1}{2}$ in., obovate, obtuse, dark-green. Racemes not much longer than the leaves, broad and dense. Flowers large, $\frac{1}{4}-\frac{1}{2}$ in. diam. Capsule $\frac{1}{4}-\frac{1}{2}$ in., twice as long as the calyx | 1. <i>V. speciosa</i> . |
| Leaves $2-4 \times \frac{1}{2}-1$ in., linear-oblong, fleshy, pale-green. Racemes 3–5 in. Flowers $\frac{1}{4}$ in. diam. Capsule $\frac{1}{2}-\frac{1}{4}$ in., nearly thrice as long as the calyx | 2. <i>V. Dieffenbachii</i> . |
| Leaves $1\frac{1}{2}-2 \times \frac{1}{2}-\frac{3}{4}$ in., lanceolate or oblong-lanceolate, fleshy. Racemes $1\frac{1}{2}-2\frac{1}{2}$ in. Flowers $\frac{1}{2}$ in. diam. Capsule $\frac{1}{2}$ in., twice as long as the calyx | 3. <i>V. Barkeri</i> . |
| Leaves $1\frac{1}{2}-3 \times \frac{1}{2}-1\frac{1}{2}$ in., obovate-oblong to linear-oblong. Racemes 2–5 in., often curved, very dense. Flowers $\frac{1}{2}-\frac{1}{4}$ in. diam. Capsule $\frac{1}{2}$ in., nearly twice as long as the calyx | 4. <i>V. macroura</i> . |
| Leaves $\frac{3}{4}-1\frac{1}{4} \times \frac{1}{4}-\frac{1}{2}$ in., oblong or elliptic-oblong. Racemes 2–3 in., dense-flowered. Flowers $\frac{1}{2}$ in. diam. Calyx-segments ovate-oblong, equalling the short corolla-tube. Capsule $\frac{1}{2}$ in., elliptic, twice as long as the calyx | 5. <i>V. divergens</i> . |
| Leaves $1-2 \times \frac{1}{4}-\frac{1}{2}$ in., linear-oblong to oblong-lanceolate, obtuse or subacute. Racemes 2–3 in., lax. Flowers | |

- $\frac{1}{2}$ – $\frac{1}{4}$ in. diam. Calyx-segments ovate-lanceolate, acute, longer than the short and broad corolla-tube. Capsule $\frac{1}{2}$ in. .. 6. *V. ligustrifolia*.
- Leaves $1\frac{1}{2}$ –3 \times $\frac{1}{3}$ – $\frac{1}{2}$ in., oblong-lanceolate, pubescent with short soft hairs. Other characters as in *V. salicifolia* .. 7. *V. pubescens*.
- Leaves 2–6 \times $\frac{1}{3}$ – $\frac{2}{3}$ in., lanceolate or oblong-lanceolate, acute, glabrous. Racemes 3–10 in. Flowers $\frac{1}{2}$ in. diam. Corolla-tube longer than the calyx. Capsule $\frac{1}{3}$ – $\frac{1}{2}$ in., ovate, acute, scarcely twice the length of the calyx .. 8. *V. salicifolia*.
- Leaves 3–4 \times $\frac{3}{4}$ – $1\frac{1}{2}$ in., oblong or elliptic-lanceolate, sub-acute. Racemes 3–6 in. Flowers $\frac{1}{2}$ in. diam. Capsule $\frac{1}{2}$ in., suborbicular, obtuse, twice as long as the calyx .. 9. *V. rotundata*.
- Leaves 3–6 \times $\frac{1}{3}$ –1 in., lanceolate, acute. Racemes 3–7 in. Flowers large, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. Capsule large, $\frac{1}{4}$ – $\frac{1}{2}$ in., ovate, acute, thrice as long as the calyx .. 10. *V. macrocarpa*.
- Leaves 1–3 \times $\frac{1}{2}$ –1 in., elliptic-lanceolate or elliptic-oblong, acute. Racemes 2–4 in., lax. Flowers large, $\frac{1}{2}$ in. diam., white. Calyx-segments acute. Capsule $\frac{1}{2}$ in., twice as long as the calyx .. 11. *V. amabilis*.
- Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ \times $\frac{3}{4}$ –1 in., oblong or elliptic-oblong, margins and midrib and branchlets pubescent. Racemes short, stout, 2– $2\frac{1}{2}$ in. Flowers large, $\frac{1}{2}$ in. diam., bluish-white. Capsule $\frac{1}{2}$ in., twice as long as the calyx .. 12. *V. Lewisii*.
- Prostrate or trailing. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ \times $\frac{1}{4}$ – $\frac{3}{4}$ in., obovate-oblong to elliptic-oblong, obtuse. Racemes short and dense, obtuse. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. diam. Capsule twice as long as the calyx .. 13. *V. chathamica*.
- ** Leaves narrow, linear-lanceolate or narrow linear-oblong, never more than $\frac{1}{2}$ in. broad.
- Small shrub. Leaves 2–3 \times $\frac{1}{5}$ – $\frac{1}{4}$ in., linear-lanceolate, obtuse, flat. Racemes 2–4 in. Calyx-segments long, ovate-lanceolate, acute, exceeding the short and broad corolla-tube .. 14. *V. acutiflora*.
- Large spreading shrub. Leaves $1\frac{1}{2}$ – $3\frac{1}{2}$ \times $\frac{1}{5}$ – $\frac{1}{4}$ in., narrow-linear or linear-lanceolate, often deflexed. Racemes 2–5 in., longer than the leaves. Flowers $\frac{1}{2}$ in. diam. Calyx-segments small, oblong, obtuse, one-third the length of the narrow corolla-tube .. 15. *V. angustifolia*.
- Large shrub or small tree, 6–20 ft. Leaves 1– $2\frac{1}{2}$ \times $\frac{1}{5}$ – $\frac{1}{4}$ in., linear-lanceolate, acute. Racemes equalling the leaves, dense-flowered. Flowers $\frac{1}{2}$ in. diam. Calyx-segments broadly oblong, obtuse, half the length of the broad corolla-tube. Capsule $\frac{1}{2}$ in. .. 16. *V. parviflora*.
- Leaves $\frac{3}{4}$ – $1\frac{1}{4}$ \times $\frac{1}{5}$ – $\frac{1}{3}$ in., linear-oblong, obtuse, flat. Racemes 2–4 in., much longer than the leaves. Flowers $\frac{1}{2}$ – $\frac{1}{3}$ in. diam. Calyx-segments small, oblong, obtuse, about half the length of the corolla-tube. Capsule $\frac{1}{2}$ in., broadly oblong .. 17. *V. leiophylla*.
- Leaves 1– $2\frac{1}{2}$ \times $\frac{1}{5}$ – $\frac{1}{3}$ in., lanceolate, acute, flat. Racemes 3–5 in., much longer than the leaves. Flowers $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. Calyx-segments short, obtuse, not much shorter than the corolla-tube. Capsule $\frac{1}{2}$ in. long, broadly oblong .. 18. *V. gracillima*.

Section II. Large or small shrubs, erect or decumbent below. Leaves $\frac{1}{8}$ – $1\frac{1}{4}$ in. long, usually close-set, often imbricate, flat or concave or keeled. Racemes or spikes usually short, simple or corymbosely branched, often crowded towards the ends of the branches.

* Flowers racemose; racemes more or less corymbosely branched, rarely simple.

- Leaves $\frac{3}{4}$ – $1\frac{1}{4} \times \frac{1}{8}$ – $\frac{1}{3}$ in., oblong-obovate, flat or nearly so, glaucous. Racemes corymbosely branched, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long. Flowers $\frac{1}{4}$ in. diam., lavender-blue. Calyx-segments ovate, acute. Corolla-tube half as long again as the calyx. Capsule more than twice as long as the calyx .. 19. *V. insularis*.
- Leaves $\frac{1}{2}$ – $\frac{3}{4} \times \frac{1}{4}$ in., elliptic-oblong, acute, flat or nearly so. Racemes much branched, forming a terminal panicle 2 in. diam. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., white. Calyx-segments narrow-ovate, acute. Corolla-tube slightly longer than the calyx .. 20. *V. venustula*.
- Leaves $\frac{1}{2}$ – $1 \times \frac{1}{8}$ – $\frac{1}{3}$ in., linear-oblong, rigid, acute, keeled. Racemes about 1 in., much corymbosely branched. Calyx usually 3-partite; segments obtuse. Corolla-tube not much longer than the calyx. Capsule $\frac{1}{2}$ in., twice as long as the calyx .. 21. *V. diosmæfolia*.
- Leaves $\frac{1}{2}$ – $1 \times \frac{1}{8}$ – $\frac{1}{4}$ in., lanceolate or linear-oblong, acute, flat or slightly keeled. Racemes 1–2 in., much corymbosely divided. Calyx 4-partite; segments acute. Corolla-tube twice as long as the calyx. Capsule $\frac{1}{2}$ in. .. 22. *V. Menziesii*.
- Leaves $\frac{3}{4}$ – $1\frac{1}{2} \times \frac{1}{8}$ – $\frac{1}{3}$ in., linear-oblong, acute, flat, glaucous, margins often incised. Racemes exceeding the leaves, sparingly divided, rarely simple. Calyx-segments ovate-lanceolate, acute. Corolla-tube shorter than the calyx .. 23. *V. Colensoi*.
- Leaves $\frac{1}{2}$ – $\frac{3}{4} \times \frac{1}{8}$ – $\frac{1}{4}$ in., linear-oblong or narrow obovate-oblong, acute, keeled, rigid, glaucous. Racemes short, equalling the leaves, trifurcate. Calyx-segments oblong, obtuse. Corolla-tube nearly twice as long as the calyx. Capsule $\frac{1}{2}$ – $\frac{1}{3}$ in. .. 24. *V. rigidula*.
- Leaves $\frac{1}{2}$ – $1 \times \frac{1}{4}$ – $\frac{1}{3}$ in., long-petioled, linear-obovate to linear-oblong, obtuse, flat, glaucous. Racemes trifurcate. Calyx-segments oblong, obtuse. Corolla-tube half as long again as the calyx. Capsule $\frac{1}{4}$ in. long, broadly oblong .. 25. *V. rupicola*.
- Leaves $\frac{1}{2}$ – $\frac{3}{4} \times \frac{1}{8}$ – $\frac{1}{3}$ in., ovate-oblong or obovate-oblong, closely imbricate, rigid, keeled. Racemes $\frac{3}{4}$ – $1\frac{1}{2}$ in., corymbosely branched. Calyx-segments oblong, obtuse. Corolla-tube less than twice as long as the calyx .. 26. *V. lævis*.

** Flowers racemose; racemes simple, rarely branched.

- Leaves $\frac{1}{2}$ – $1\frac{1}{4} \times \frac{1}{4}$ – $\frac{1}{2}$ in., elliptic-oblong, apiculate, petiolate. Branchlets and margins of leaves hoary. Racemes 1– $1\frac{1}{2}$ in. long. Flowers large, white, $\frac{1}{2}$ in. diam. or more, sweet-scented. Capsule $\frac{1}{4}$ – $\frac{1}{3}$ in. .. 27. *V. elliptica*.
- Leaves $\frac{3}{4}$ – $1\frac{1}{2} \times \frac{1}{8}$ – $\frac{1}{3}$ in., oblong or elliptic-oblong, obtuse, flat. Racemes 2–4 in. long, dense. Flowers large, white or purplish, $\frac{1}{2}$ in. diam. Calyx-segments oblong, obtuse. Corolla-tube twice as long as the calyx .. 28. *V. Matthewsii*.

- Leaves $\frac{1}{3}$ – $\frac{2}{3}$ in., elliptic-ovate, margins red. Racemes 2–3 in. long. Flowers large, pale violet-blue, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam. Calyx-segments acute, equalling the short corolla-tube 29. *V. Balfouriana*.
- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{3}$ – $\frac{1}{2}$ in., ovate-lanceolate to narrow elliptic-oblong, acute, flat, glaucous. Racemes $\frac{3}{4}$ – $1\frac{1}{2}$ in. long. Flowers white, $\frac{1}{4}$ in. diam. Calyx-segments broadly ovate, almost as long as the corolla-tube 30. *V. Darwiniana*.
- Leaves $\frac{1}{3}$ – $1 \times \frac{1}{3}$ – $\frac{1}{2}$ in., elliptic-oblong or elliptic-lanceolate, acute, keeled or flat, often close-set. Racemes 1–3 in. long. Flowers white, $\frac{1}{4}$ in. diam. Calyx-segments broadly oblong, obtuse, corolla-tube nearly twice as long as the calyx (longer in var. *elegans*) 31. *V. Traversii*.
- Leaves $\frac{3}{4}$ – $1\frac{1}{2} \times \frac{1}{4}$ – $\frac{1}{2}$ in., lanceolate, acute or subacute, flat. Racemes 1–2 in. long. Calyx-segments ovate-lanceolate, acute. Corolla-tube scarcely longer than the calyx; limb longer than the tube 32. *V. subalpina*.
- Leaves $\frac{1}{4}$ – $\frac{3}{4} \times \frac{1}{3}$ – $\frac{1}{2}$ in., obovate-oblong, flat, obtuse or apiculate, often distichous. Racemes $\frac{1}{2}$ – $1\frac{1}{2}$ in. Calyx-segments oblong, obtuse, equalling the corolla-tube. Capsule twice as long as the calyx or more 33. *V. vernicosa*.
- Leaves $\frac{3}{4}$ – $1 \times \frac{1}{4}$ – $\frac{1}{2}$ in., narrow-obovate, obtuse, flat or nearly so. Racemes 1–2 in., lax. Calyx-segments ovate-oblong, obtuse. Corolla-tube slightly longer than the calyx 34. *V. obovata*.
- Leaves $\frac{3}{4}$ – $1 \times \frac{1}{3}$ – $\frac{1}{2}$ in., obovate-oblong or elliptic-oblong, obtuse or subacute, slightly concave, usually close-set. Racemes 1– $1\frac{1}{2}$ in. long. Calyx-segments oblong-ovate, obtuse. Corolla-tube scarcely longer than the calyx .. 35. *V. monticola*.
- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{4}$ – $\frac{1}{2}$ in., oblong or obovate-oblong, obtuse, flat, glaucous beneath, black when dry; branchlets pubescent. Racemes $\frac{1}{2}$ – 1 in. Flowers $\frac{1}{4}$ – $\frac{1}{2}$ in., white. Calyx-segments ovate-oblong, obtuse. Corolla-tube as long as the calyx 36. *V. Cockayneana*.

*** Flowers spicate (often racemose in *V. decumbens*). Spikes usually simple. Leaves close-set, imbricate, concave, rounded or keeled at the back.

- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{3}$ – $\frac{1}{2}$ in., obovate-oblong, closely imbricate, keeled, truncate or subcordate at the base. Spikes crowded at the ends of the branches; bracts large, coriaceous 37. *V. buxifolia*.
- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{3}$ – $\frac{1}{2}$ in., linear-oblong, keeled. Spikes crowded, forming a short terminal panicle. Corolla often 3-lobed, the auticous lobe either suppressed or very small 38. *V. anomala*.
- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{3}$ – $\frac{1}{2}$ in., oblong-obovate, flat or slightly concave, margins bright-red. Racemes short, dense. Calyx-segments ovate, acute. Corolla-tube twice as long as the calyx. Capsule ovate, acute, glabrous 39. *V. decumbens*.
- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{4}$ – $\frac{1}{2}$ in., ovate, margins fringed with long soft hairs. Racemes slightly longer than the leaves, densely villous. Calyx-segments lanceolate, acute. Corolla-tube nearly twice as long as the calyx 40. *V. Gibbsii*.
- Leaves $\frac{1}{3}$ – $\frac{2}{3} \times \frac{1}{3}$ – $\frac{1}{2}$ in., broadly obovate or suborbicular, deeply concave, glaucous, nerveless. Spikes crowded, short, stout, dense. Calyx-segments obtuse, equalling the corolla-tube. Capsule ovate, acute, glabrous .. 41. *V. carnosula*.

- Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ \times $\frac{1}{3}$ – $\frac{2}{3}$ in., cordate or semiamplexicaul, deeply concave, glaucous, nerveless. Spikes 1– $1\frac{1}{2}$ in. long, dense. Calyx-segments obtuse, equalling the corolla-tube. Capsule oblong, obtuse, pubescent 42. *V. amplexicaulis*.
- Leaves $\frac{1}{4}$ – $\frac{3}{4}$ \times $\frac{1}{8}$ – $\frac{1}{2}$ in., obovate-oblong or suborbicular, deeply concave, glaucous, nerveless. Spikes short, dense. Calyx-segments obtuse, equalling the corolla-tube. Capsule oblong or obovate, obtuse, pubescent 43. *V. pinguifolia*.
- Leaves $\frac{1}{2}$ – $\frac{1}{3}$ \times $\frac{1}{8}$ – $\frac{1}{4}$ in., broadly oblong or suborbicular, concave, nerveless, very coriaceous. Spikes short, dense, villous. Calyx-segments obtuse, exceeding the corolla-tube. Capsule oblong, obtuse, pubescent 44. *V. Buchanani*.
- Leaves $\frac{1}{2}$ – $\frac{1}{3}$ in., obovate-oblong to lanceolate, usually lax, glaucous, obtusely keeled. Spikes $\frac{1}{2}$ –1 in., villous. Calyx-segments ovate, acute, exceeding the corolla-tube. Capsule ovate, acute, glabrous or pubescent 45. *V. pimeleoides*.

Section III. Small shrubs, erect or decumbent or prostrate. Leaves dimorphic; of mature plants small, short and thick, densely quadrifariously imbricated or rarely in distant pairs; of young plants larger, spreading, entire or irregularly lobulate or pinnatifid. Flowers crowded near the tips of the branches or in subterminal 2-4-flowered abbreviated spikes.

* Prostrate or decumbent, rarely erect. Flowers in 2-4-flowered abbreviated spikes near the ends of the branches and distinct from them.

- Laxly branched, 3-12 in. long; branches $\frac{1}{2}$ in. diam. Leaves $\frac{1}{2}$ – $\frac{1}{3}$ in., erecto-patent, linear-oblong, obtuse, margins strongly ciliate-denticulate 46. *V. Gilliesiana*.
- Much and closely branched, 3-9 in. diam.; branches $\frac{1}{12}$ – $\frac{1}{10}$ in. diam., tetragonous with the faces concave. Leaves most densely quadrifarious, $\frac{1}{14}$ – $\frac{1}{10}$ in., ovate or narrow-deltoid, narrowed to a subacute point 47. *V. tetrasticha*.
- Much and closely branched, 3-9 in. diam.; branches $\frac{1}{15}$ in. broad, tetragonous with the faces flat. Leaves most densely quadrifarious, $\frac{1}{18}$ – $\frac{1}{16}$ in. long, broadly triangular, acute 48. *V. quadrifaria*.

** Erect or spreading or rarely decumbent. Flowers 3-8 near the ends of the branches, forming small terminal heads; bracts similar to the leaves or broader.

† Leaves densely imbricate with the opposite pairs connate and appressed, concealing the branch and giving it somewhat of the appearance of whipecord.

- Prostrate, forming patches 6-18 in. across; branches $\frac{1}{12}$ – $\frac{1}{10}$ in. diam., obtusely tetragonous. Leaves densely quadrifarious, $\frac{1}{15}$ – $\frac{1}{12}$ in. long, broadly ovate-deltoid, obtuse, tumid 49. *V. tumida*.
- Stout, erect; branches tetragonous, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam. Leaves $\frac{1}{12}$ – $\frac{1}{10}$ in. long, deltoid-ovate, obtuse 50. *V. tetragona*.
- Stout, erect; branches tetragonous, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam. Leaves $\frac{1}{12}$ – $\frac{1}{10}$ in. long, broadly deltoid-ovate, suddenly narrowed into a short obtuse cusp 51. *V. lycopodioides*.
- Stout, erect; branchlets terete or obscurely tetragonous, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., blackish-brown when dry. Leaves connate into a closely appressed ring $\frac{1}{10}$ in. long, orbicular-oblong, obtuse 52. *V. Hectori*.

- Stout, erect or decumbent; branches terete or obscurely tetragonous, $\frac{1}{12}$ – $\frac{1}{10}$ in. diam., blackish-brown when dry. Leaves connate into a closely appressed ring $\frac{1}{10}$ in. long, tips obtuse or subacute 53. *V. coarctata*.
- Strict, erect; branchlets terete, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., yellow-green when dry. Leaves connate into a closely appressed ring $\frac{1}{5}$ – $\frac{1}{2}$ in. long, subacute or truncate at the tip 54. *V. salicornioides*.
- Spreading, much branched; branches often flabellate; branchlets terete, slender, $\frac{1}{8}$ – $\frac{1}{4}$ in. diam. Leaves connate into an obconic sheath or ring $\frac{1}{10}$ in. long loosely investing the branch, and which is open at the top and truncate or nearly so 55. *V. Armstrongii*.
- Spreading or decumbent; branchlets terete, very slender, $\frac{1}{10}$ in. diam. Leaves connate into a narrow sheath $\frac{1}{10}$ – $\frac{1}{8}$ in. long, lower part adnate to the branch, upper part free and slightly expanded 56. *V. propinqua*.

†† Leaves in remote decussate pairs.

- Branchlets slender, $\frac{1}{10}$ in. diam. Leaves minute, appressed or patent, $\frac{1}{15}$ – $\frac{1}{5}$ in. long 57. *V. cupressoides*.

Section IV. Small decumbent or prostrate shrubs; branches short, ascending. Leaves small, $\frac{1}{4}$ – $\frac{3}{4}$ in. long. Flowers in terminal oblong or ovoid heads continuous with the branch. Corolla-tube long and narrow; limb small.

- Leaves densely imbricated, fleshy when fresh, erect or spreading, not keeled 58. *V. Haastii*.
- Leaves densely imbricated, spreading and recurved, coriaceous, sharply keeled 59. *V. epacridea*.
- Leaves not imbricated, spreading, oblong, flat. Bracts very numerous, crowded, linear 60. *V. Petriei*.

Section V. Small prostrate woody plants 2–6 in. long. Leaves closely quadrifariouly imbricate, rigidly coriaceous, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Flowers large, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., solitary and terminal, pentamerous.

- Branches $\frac{1}{4}$ in. diam. Leaves oblong-obovate, $\frac{1}{8}$ – $\frac{1}{6}$ in. long. Calyx hispid below 61. *V. dasyphylla*.
- Branches $\frac{1}{8}$ in. diam. Leaves oblong, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Calyx hispid throughout. Ovary villous at the tip 62. *V. uniflora*.

SUBDIVISION B. Leaves crenate-toothed or serrate (obscurely toothed or entire in *V. erecta*).

* Flowers racemose.

- Rigid, sparingly branched. Leaves $\frac{1}{2}$ –1 in., narrow-obovate. Racemes short, 5–8-flowered. Flowers 4-merous, large, white, $\frac{3}{4}$ in. diam. 63. *V. macrantha*.
- Much branched. Leaves $\frac{1}{2}$ –1½ in., linear-oblong, margined with white down. Racemes long, many-flowered. Flowers 5-merous, bright-blue, $\frac{1}{2}$ – $\frac{1}{2}$ in. diam. 64. *V. Benthami*.
- Sparingly branched, erect. Leaves $\frac{3}{4}$ –1 in., oblong-lanceolate, entire or obscurely toothed. Racemes long, 3–4 in., strict. Flowers small, $\frac{1}{8}$ in. diam. 65. *V. erecta*.

** Flowers sessile in branched panicles or corymbs.

- Laxly branched, 1-3 ft. high. Leaves 1-2 in., broadly ovate. Panicle terminal, slender, much branched, 6-12 in. long. Flowers $\frac{1}{4}$ in. diam. .. 66. *V. Hulkeana*.
 Decumbent below, 4-8 in. high. Leaves $\frac{1}{2}$ -1 in., broadly ovate. Flowers in a dense corymb 1-2 in. across .. 67. *V. Lavaudiana*.
 Decumbent or erect, 4-12 in. high. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong-spathulate. Flowers in lateral and terminal clusters, often forming a close terminal panicle .. 68. *V. Raoulia*.

DIVISION II., PYGMEA. *Capsule turgid, the septum across the broadest diameter. Small depressed pulvinate herbs. Leaves minute, densely imbricated all round the branches. Flowers solitary and terminal. Corolla-limb 5-lobed or rarely abnormally 6-lobed.*

- Leaves $\frac{1}{10}$ in., linear-oblong, margins and both surfaces above the middle hoary with long white hairs .. 69. *V. pulvinaris*.
 Leaves $\frac{1}{10}$ - $\frac{1}{8}$ in., rhomboid-obovate, margins and back above the middle hispid, rarely almost glabrous .. 70. *V. Thomsoni*.
 Leaves $\frac{1}{8}$ - $\frac{1}{4}$ in., broadly obovate-spathulate, coriaceous, margins ciliate with long stiff hairs, both surfaces glabrous .. 71. *V. ciliolata*.

DIVISION III., EUVERONICA. *Capsule laterally compressed, the septum across the narrowest diameter. Perennial herbs, sometimes woody at the base. Stems prostrate or decumbent or suberect. Leaves toothed or serrate, rarely entire. Flowers in axillary racemes or solitary. Corolla-tube short.*

* Flowers racemose.

- Stems woody, much branched, 6-12 in. high; branches slender. Leaves $\frac{1}{2}$ - $\frac{1}{4}$ in., ovate-lanceolate, acute, entire or toothed. Racemes short, crowded at the tips of the branches. .. 72. *V. loganioides*.
 Stems procumbent and ascending, diffusely branched, 2-9 in. long. Leaves $\frac{1}{2}$ -1 in., linear, obtuse, entire .. 73. *V. linifolia*.
 Stems prostrate below, erect above, simple or sparingly branched, 6-24 in. long. Leaves $\frac{1}{2}$ -4 in., lanceolate to ovate, serrate. Racemes 3-9 in. long .. 74. *V. catarractæ*.
 Stems prostrate and rooting, diffusely branched, 3-18 in. long. Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in., ovate or oblong, serrate, glabrous. Racemes slender, glabrous or nearly so .. 75. *V. Lyallii*.
 Stems prostrate and rooting, much branched, 3-10 in. long. Leaves minute, $\frac{1}{10}$ - $\frac{1}{4}$ in., with 1 or 2 teeth on each side. Peduncle long, strict, erect .. 76. *V. Bidwillii*.
 Stems stout, prostrate, 3-10 in. long. Leaves crowded, $\frac{1}{2}$ - $\frac{1}{4}$ in., ovate, serrate, usually pubescent on both surfaces. Raceme very stout, densely glandular-pubescent, 4-8-flowered. Capsule broadly oblong .. 77. *V. Hookeriana*.
 Stems rather slender, prostrate, 3-6 in. long. Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in., ovate, serrate, glabrous. Racemes rather slender, pubescent, many-flowered. Capsule oblong .. 78. *V. Olseni*.

- Stems tufted and prostrate, much branched, 3-6 in. long.
 Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., ovate or deltoid-spathulate, crenate-lobed, glandular-pubescent; petioles long. Racemes very short 79. *V. spathulata*.
 Stems prostrate, elongated, 1-3 ft. long. Leaves petiolate; lamina $\frac{1}{2}$ -1 in., ovate-deltoid, coarsely toothed. Racemes lateral, short, 2-5 in. long 80. *V. plebeia*.
 Stems suberect, glabrous, 6-18 in. high. Leaves 1-3 in., linear-oblong, serrate, sessile. Racemes 4-10 in. long, many-flowered 81. *V. Anagallis*.

** Flowers solitary.

- Stems prostrate, 6-12 in. long; branchlets erect. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., oblong or obovate, toothed or entire. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. diam. 82. *V. Muelleri*.
 Densely tufted, forming rounded patches 2-5 in. across. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., narrow-obovate, coarsely toothed. Flowers $\frac{1}{2}$ in. diam. Calyx-segments toothed 83. *V. Cheesemanii*.
 Creeping, matted. Leaves minute, $\frac{1}{10}$ - $\frac{1}{10}$ in., ovate, entire. Flowers $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. 84. *V. canescens*.

V. carnea, Armstr. in Trans. N.Z. Inst. xiii. (1881) 357, is a garden-plant of unknown origin, and has never been found in the wild state. It is probably a hybrid. *V. macrocalyx* and *V. rugulosella*, Col. in Trans. N.Z. Inst. xxiv. (1892) 391, and *V. oligantha*, Col. l.c. xxv. (1893) 333, are proved by the types in Mr. Colenso's herbarium to be nothing more than slight varieties of the naturalised *V. serpyllifolia*, Linn. Similarly, *V. longiracemosa*, Col. l.c. xx. (1888) 203, and *V. hirsuta*, Col. l.c. xxiv. (1892) 393, are *V. arvensis*, Linn.; and *V. areolata*, Col. l.c. 392, is *V. persica*, Poir (*V. Buxbaumii*, Ten), both species being now naturalised throughout the colony. In the absence of authentic specimens, I have been unable to precisely identify *V. Rakaiensis*, Armstr. l.c. xiii. (1881) 356, and *V. polyphylla*, Col. l.c. xxxi. (1899) 277.

1. *V. speciosa*, R. Cunn. in Bot. Mag. sub. t. 3461.—A stout glabrous shrub 2-5 ft. high with numerous spreading leafy branches; branchlets thick, angled, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. Leaves spreading, sessile or on very short thick petioles, 2-4 in. long, 1-1 $\frac{3}{4}$ in. broad, obovate or obovate-oblong, rounded at the tip, truncate or slightly cordate at the base or narrowed into the petiole, thick and coriaceous, dark-green and glossy, midrib downy above, lateral veins obsolete, margins entire. Racemes axillary and opposite, near the tips of the branches, not much longer than the leaves; very stout and dense-flowered, sometimes exceeding 1 $\frac{1}{2}$ in. diam.; rhachis puberulous; pedicels short, spreading. Flowers large, $\frac{1}{2}$ in. diam., dark reddish-purple or violet-purple. Calyx 4-partite; segments ovate, subacute or obtuse, ciliolate. Corolla-tube broad, funnel-shaped, half as long again as the calyx; limb 4-lobed; lobes oblong, obtuse, the dorsal lobe rather larger than the lateral, anterior the smallest. Capsule $\frac{1}{4}$ - $\frac{1}{2}$ in. long, ovate, compressed, more than twice as long as the calyx.—*A. Cunn. Precur.* n. 373; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 191; *Handb. N.Z. Fl.* 206; *Bot. Mag.* t. 4057; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351. *V. Kermesina*, *Loud. Encyc. Pl.* 1546.

Var. **brevifolia**, *Cheesem.*—Leaves smaller and narrower, 1–2½ in. long by ½–¾ in. broad, oblong-obovate to linear-oblong, obtuse or subacute. Racemes and flowers smaller.

NORTH ISLAND: North Cape (var. *brevifolia*), *T. F. C.*; south head of Hokianga Harbour, *R. Cunningham, Kirk!* Maunganui Bluff, *Petrie!* Urenui (Taranaki), *T. F. C.*; Port Nicholson, *Lyall.* SOUTH ISLAND: Marlborough—Ship Cove, *Lyall*; Pelorus Sound, *J. Rutland!* November–March.

A remarkably rare and local species, confined to cliffs near the sea. All the wild specimens that I have seen have the flowers dark reddish-purple, but in cultivation they frequently become violet-purple. It hybridises freely with *V. salicifolia*, *macrocarpa*, *elliptica*, and probably other species, and several of the hybrids have become common garden-plants.

2. **V. Dieffenbachii**, *Benth. in D.C. Prodr.* x. 459.—A robust much-branched shrub; branches widely divaricating, 2–5 ft. long or more; branchlets stout, green, terete, ⅙–¼ in. diam., glabrous or puberulous. Leaves spreading, often recurved, sessile and semi-amplexicaul, 2–4 in. long, ½–1 in. broad, linear-oblong, rarely broader and almost oblong, acute or subacute, coriaceous or almost fleshy, pale-green, midrib stout, prominent beneath, lateral veins very indistinct, margins slightly recurved when fresh. Racemes pedunculate, suberect, exceeding the leaves, 2½–5 in. long, ¾–1 in. diam., dense-flowered; rhachis stout; pedicels spreading, ⅒–⅙ in. long, with a minute subulate bract at the base. Flowers ¼ in. diam., usually lilac-purple. Calyx small, 4-partite; segments ovate-oblong or ovate-lanceolate, acute, ciliate. Corolla-tube funnel-shaped, exceeding the calyx; limb 4-lobed; dorsal and lateral lobes broadly oblong, anterior narrower. Capsule ⅓–¼ in. long, ovate, acute, glabrous, about 2½ times as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i. 191; *Handb. N.Z. Fl.* 206; *Bot. Mag.* t. 7656; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 531; *Gard. Chron.* ii. (1898) p. 154, t. 41. *V. Forsteri*, *F. Muell. Veg. Chat. Is.* 46 (*in part*).

CHATHAM ISLANDS: Apparently not uncommon, *Dieffenbach, H. H. Travers Enys!* *Cox and Cockayne!*

In cultivation this puts out numerous stout almost horizontal branches close to the ground, so that a single plant occupies quite a large space without rising to a greater height than 3 ft. or 4 ft.; but Mr. Cockayne informs me that this peculiarity is not so noticeable in the wild state. I am also indebted to him for a series of specimens showing a considerable range of variation in the size and shape of the leaves and their texture, the length of the raceme, size of the flowers, &c., apparently accompanied by slight differences in the mode of growth. It seems doubtful whether the whole of these are referable to *V. Dieffenbachii*, but the question is one that cannot be settled without much more ample material than I possess.

3. **V. Barkeri**, *Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 421.—A stout branching shrub; branches erect, not divaricating, terete, the younger ones brownish-purple. Leaves spreading, sessile, 2 in.

long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, lanceolate or oblong-lanceolate, acute or sub-acute, narrowed towards the base, thick and fleshy, pale dull-green, midrib scarcely prominent beneath. Racemes opposite near the ends of the branches, about as long as the leaves, dense-flowered; rhachis and pedicels pubescent; bracts subulate, half as long as the pedicels. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., pale-lilac. Calyx small, deeply 4-partite; segments ovate-lanceolate, acute. Corolla-tube slightly longer than the calyx; limb spreading, 4-lobed; dorsal and lateral lobes subequal, broadly oblong, obtuse, anterior lobe smaller. Capsule $\frac{1}{6}$ in. long, ovate, acute, about twice as long as the calyx.

CHATHAM ISLANDS: *Barker, Cockayne!*

I fear that this is much too close to *V. Dieffenbachii*, but my specimens are very indifferent. According to Mr. Cockayne, it differs "in its erect not spreading habit, smaller leaves, shorter racemes, in its extremely pubescent style, and in the midrib not conspicuously raised."

4. **V. macroura**, *Hook. f. ex Benth. in D.C. Prodr.* x. 549.—A much-branched glabrous shrub 1–5 ft. high; branches rather stout, spreading, terete. Leaves spreading, sessile or very shortly petiolate, 1–3 in. long, $\frac{1}{2}$ – $1\frac{1}{4}$ in. broad, obovate-oblong to obovate-lanceolate or linear-oblong, obtuse or acute, hardly coriaceous, flat, glabrous or the margins minutely pubescent. Racemes longer than the leaves, 2–4 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., often curved, very densely many-flowered; rhachis and pedicels finely pubescent, the latter slender, spreading or subsecund, often pendulous in fruit. Flowers small, densely compacted, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., white or pale bluish-white. Calyx deeply 4-partite; segments narrow-oblong, acute, finely pubescent, margins ciliolate. Corolla-tube slender, exceeding the calyx; limb small, with narrow-oblong obtuse lobes. Capsules densely crowded, usually pendulous, small, ovate, compressed, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, scarcely twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i. 191; *Handb. N.Z. Fl.* 207; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 531.

Var. **Cookiana**, *Cheesem.*—Stouter and more robust. Leaves larger, 2–3½ in. long, $1\frac{1}{4}$ – $1\frac{3}{4}$ in. broad, oblong or oblong-ovate, broad at the base, pubescent on the margins and sometimes on the midrib beneath. Racemes 3–6 in. long, conspicuously curved. Calyx more pubescent.—*V. Cookiana, Col. in Trans. N.Z. Inst.* xx. (1888) 201.

Var. **ubia**, *Cheesem.*—Smaller; branches very diffuse, often procumbent. Leaves smaller and broader, 1–2 in. long, $\frac{1}{2}$ –1 in. broad, broadly obovate to elliptic-oblong, obtuse or acute, subcoriaceous, glabrous except the margins, which are edged with a white pubescent line. Racemes smaller, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, not so dense. Flowers rather larger, $\frac{1}{3}$ in. diam. Calyx conspicuously ciliate. Capsules $\frac{1}{2}$ in. long.

NORTH ISLAND: Whangarei, *Colenso* (Handbook); East Cape district, from Hicks Bay to Mahia Peninsula, *Colenso! Bishop Williams! H. Hill!* Cook Strait, *Colenso* (Handbook). Var. *Cookiana*: Table Cape, *H. Hill!* Var. *ubia*: Coast north of the Manukau Harbour, *T. F. C.*

Best recognised by the dense curved racemes, small flowers, narrow corolla-lobes, and small densely compacted capsules. It is a purely littoral plant, abundant on cliffs near the sea in the East Cape district, but has not been seen at Whangarei or Cook Strait of late years. The South Island locality of Tarn-dale, ascribed to it in the Handbook, is almost certainly erroneous.

5. **V. divergens**, *Cheesem. n. sp.* — A much-branched shrub 2-5 ft. high; branches stout, spreading, the younger ones puberulous. Leaves spreading, sessile or very shortly petiolate, $\frac{3}{4}$ - $1\frac{1}{4}$ in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, oblong or linear-oblong to elliptic-oblong or -ovate, acute or obtuse, narrowed at the base, flat, coriaceous, quite glabrous, midrib distinct on both surfaces, margins entire. Racemes axillary and opposite near the tips of the branches, stout, peduncled, 2-3 in. long or more, dense-flowered; rhachis pubescent; pedicels as long as the calyx; bracts equalling the pedicels or rather shorter. Flowers $\frac{1}{5}$ - $\frac{1}{4}$ in. diam., white. Calyx 4-partite; segments oblong-ovate, obtuse or acute, margins ciliate. Corolla-tube short and broad, not exceeding the calyx; limb longer than the tube, 4-lobed; lobes broadly oblong, obtuse, the anterior one narrower. Stamens exserted. Capsule $\frac{1}{6}$ in. long, broadly elliptic-oblong, subacute, compressed, glabrous, twice as long as the calyx.

SOUTH ISLAND: Nelson—Coast near Brighton, to the south of Westport, *Townson!*

Although unwilling to create new species in a genus like *Veronica*, I feel compelled to assign specific rank to this, which appears to be well characterized by the small oblong or elliptic-oblong flat spreading leaves, dense racemes, very short and broad corolla-tube, and broadly oblong subacute capsule. In some respects it approaches *V. macroura* var. *dubia*, but its nearest ally is probably *V. salicifolia* var. *Kirkii*.

6. **V. ligustrifolia**, *A. Cunn. in Bot. Mag.* sub t. 3461.—A small laxly branched glabrous shrub 1-3 ft. high, rarely more; bark greyish-brown; branchlets slender, twiggy, terete. Leaves spreading, sessile or nearly so, 1-2 in. long, rarely more, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, oblong or linear-oblong to oblong-lanceolate, obtuse or subacute or more rarely acute, flat, quite entire. Racemes near the tips of the branches, 2-3 in. long, slender, rather lax-flowered; rhachis, pedicels, and bracts puberulous or almost glabrate. Flowers rather small, white, $\frac{1}{5}$ - $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate-lanceolate, acute, glabrous or the margins minutely ciliate. Corolla-tube funnel-shaped, shorter than the calyx; limb longer than the tube, spreading, 4-lobed; lobes acute. Capsule $\frac{1}{5}$ in. long, ovate, acute, compressed, hardly twice as long as the calyx.—*A. Cunn. Precur.* n. 375; *Benth. in D.C. Prodr.* x. 460; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 192, and *Handb. N.Z. Fl.* 208 (in part only).

NORTH ISLAND: Auckland—North Cape district, *J. Adams* and *T. F. C.*; Bay of Islands, *Cunningham*, *Colenso*, and others; Whangarei, *T. F. C.*

The plant herein described is the original *V. ligustrifolia* of A. Cunningham, and of Bentham in De Candolle's *Prodromus*. It by no means corresponds with the *ligustrifolia* of Hooker, who included in the term Bentham's *V. acutiflora* and my *leiophylla*, and possibly other plants. As a species it comes nearest to *V. salicifolia*, differing in the smaller size, paler bark, and more twiggy habit, in the much smaller and more obtuse leaves, in the lax-flowered racemes, in the acute and almost glabrous calyx-segments, and in the short broad tube of the corolla and its acute spreading lobes. I am indebted to Mr. N. E. Brown for comparing my North Cape specimens with Cunningham's type.

7. *V. pubescens*, Banks and Sol. ex Benth. in D.C. *Prodr.* x. 460.—A slender diffusely branched shrub 4–6 ft. high; branches terete, the younger ones villous with soft spreading white hairs. Leaves spreading or suberect, shortly petiolate, $1\frac{1}{2}$ –3 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, oblong-lanceolate or lanceolate, acute, narrowed towards the base, quite entire, midrib and margins and the whole of the under-surface villous with short soft white hairs. Racemes axillary, 2–4 in. long, $\frac{1}{2}$ in. diam., rather slender, many-flowered; rhachis, pedicels, and calyx densely villous. Flowers small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam. Calyx 4-partite; segments oblong-lanceolate, acute. Corolla-tube slender, longer than the calyx; limb with 4 rather narrow oblong lobes. Capsule ovate, acute, glabrous, nearly twice as long as the calyx.—Hook. f. *Fl. Nov. Zel.* i. 193; *Handb. N.Z. Fl.* 208; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351.

NORTH ISLAND: Auckland—Mercury Bay, Banks and Solander; Shoe Island (off Tairua Harbour) and Cabbage Bay, Adams!

Very near to *V. salicifolia* var. *stricta*, but at once separated by the copious hairs on the young shoots, margins and midribs of the leaves, and inflorescence. Mr. N. E. Brown informs me that Mr. Adams's specimens correspond precisely with Banks and Solander's type. Both Bentham and Hooker describe the plant as being "everywhere covered with red-brown hairs," but on the upper surface of the leaves the hairs are confined to the midrib and margins.

8. *V. salicifolia*, Forst. *Prodr.* n. 11.—An erect much-branched glabrous shrub 3–10 ft. high, more rarely taller and reaching 12–15 ft., with a trunk 9 in. diam.; branchlets slender, terete, glabrous or the younger ones minutely puberulous. Leaves sessile or nearly so, spreading, 2–6 in. long, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad, lanceolate or linear-lanceolate to oblong-lanceolate, acute or acuminate, usually narrowed at the base, entire or with a few obscure incisions, rather thin, pale-green, glabrous or slightly downy on the midrib and margins, margins flat, midrib usually prominent beneath, especially towards the base of the leaf. Racemes slender, longer than the leaves, 3–10 in. long, very many-flowered; rhachis, pedicels, and bracts pubescent or almost glabrate; pedicels slender, variable in length. Flowers $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., white with a pale-lilac tinge to pale bluish-purple, rarely quite white. Calyx 4-partite; segments lanceolate or ovate-lanceolate to ovate-oblong, acute or subacute,

glabrate or more or less pubescent. Corolla-tube funnel-shaped, from half as long again to twice as long as the calyx; limb 4-lobed, lobes oblong, obtuse. Capsule $\frac{1}{8}$ – $\frac{1}{5}$ in. long, broadly ovate, acute, compressed, from half as long again to twice as long as the calyx.—*A. Rich. Fl. Nouv. Zel.* 186; *A. Cunn. Precur.* n. 374; *Benth. in. D.C. Prodr.* x. 459; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 191; *Handb. N.Z. Fl.* 207. *V. Lindleyana*, *Pact. Mag. Bot.* xii. (1846) 247. *V. Parkinsoniana*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 97.

Var. **stricta**, *Hook. f. Fl. Nov. Zel.* i. 191.—Racemes, pedicels, and calyx-segments much more hairy, sometimes almost villous. Capsule smaller, more acute.—*V. stricta*, *Banks and Sol. ex Benth. in D.C. Prodr.* x. 459.

Var. **gigantea**, *Cheesem.*—Forming a small round-headed tree 15–25 ft. high; trunk distinct. Leaves 2–4 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, lanceolate, acute; margins ciliolate. Racemes shorter than the leaves or barely equalling them. Flowers white, $\frac{1}{8}$ – $\frac{1}{5}$ in. diam. Corolla-tube very short, hardly longer than the calyx.—*V. gigantea*, *Cockayne in Trans. N.Z. Inst.* xxxiv. (1902) 319.

Var. **Kirkii**, *Cheesem.*—A shrub 6–12 ft. high; branches robust, dark-brown, polished. Leaves smaller, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, oblong or oblong-lanceolate, coriaceous. Racemes 4–8 in. long. Flowers white, $\frac{1}{4}$ in. diam. Capsule broadly ovate, acute, hoary-pubescent, $\frac{1}{8}$ in. long.—*V. Kirkii*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 356.

KERMADEC ISLANDS: Leaves broader and thinner; racemes shorter than the leaves; calyx-segments almost equalling the capsule—perhaps a distinct species, but specimens very imperfect. NORTH AND SOUTH ISLANDS, STEWART ISLAND: The typical form and var. *stricta* abundant throughout. Var. *gigantea*: CHATHAM ISLANDS, *H. H. Travers, Cox and Cockayne!* Var. *Kirkii*: Canterbury, Upper Rangitata Valley, *Armstrong!* Sea-level to 3500 ft. *Koromiko*. December–March.

The most widely distributed of the New Zealand species, and one of the most variable. In addition to the varieties characterized above, the student will find numerous forms which appear to connect it with *V. macroua*, *Dieffenbachii*, *macrocarpa*, *ligustrifolia*, and others. In cultivation it hybridizes freely with most of the allied species, and several of the hybrids are now common in gardens, especially *V. Andersoni* (*Lindl. & Paxt. Flow. Gard.* ii. 3) the result of a cross with *V. speciosa*.

9. **V. rotundata**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 530.—A laxly branched shrub 2–6 ft. high; branches terete, glabrous. Leaves spreading, sessile or very shortly petioled, 3–4 in. long by $\frac{3}{4}$ – $1\frac{1}{4}$ in. broad, oblong-lanceolate or elliptic-lanceolate, subacute, hardly coriaceous, flat, veins obscure. Racemes usually longer than the leaves, 3–6 in. long, 1 in. diam., densely many-flowered; rhachis and pedicels puberulous. Flowers large, $\frac{1}{4}$ in. diam., violet-purple or lilac. Calyx 4-partite; segments oblong-ovate, acute or subacute. Corolla-tube short and broad, hardly equalling the spreading 4-lobed limb. Stamens long, far exserted. Capsule about $\frac{1}{5}$ in. long, suborbicular, compressed, obtuse, about twice as long as the calyx.

NORTH ISLAND: Vicinity of Wellington, *Kirk*! SOUTH ISLAND: Canterbury—Southbridge, *Kirk*! July–September

Nearest to *V. macrocarpa*, but separated from it, and from all the large-leaved species, by the almost orbicular capsule rounded at the tip. The leaves are also broader and more obtuse than in any of the forms of *V. macrocarpa*.

10. *V. macrocarpa*, *Vahl. Symb. Bot.* iii. 4.—An erect branching shrub 4–8 ft. high; branchlets rather stout, terete, glabrous. Leaves sessile or very shortly petioled, spreading, 3–6 in. long, $\frac{1}{2}$ –1 in. broad, narrow oblong-lanceolate to lanceolate or linear-lanceolate, acute, rather coriaceous, dark-green, smooth and glabrous, flat, veins obscure. Racemes usually rather longer than the leaves, 3–7 in. long, many-flowered, cylindrical, acute, sometimes attenuate at the tip; rhachis and pedicels glabrate or puberulous. Flowers large, white, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. or even more. Calyx 4-partite; segments oblong, obtuse, ciliolate. Corolla-tube broad, about twice as long as the calyx; limb 4-lobed; lobes oblong, obtuse. Stamens very long, far-exserted. Capsule large, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, ovate, compressed, acute, three times as long as the calyx.—*A. Cunn. Precur.* n. 376; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 192; *Handb. N.Z. Fl.* 207; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 529.

Var. *latisepala*, *Cheesem.*—Habit and foliage of the type, but racemes usually shorter than the leaves; flowers and capsules often secund. Calyx-segments rather broader. Flowers deep-violet.—*V. latisepala*, *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 530.

Var. *affinis*, *Cheesem.*—Leaves smaller, 2–4 in. long. Racemes shorter, 3–5 in.; flowers smaller, white. Capsules $\frac{1}{2}$ – $\frac{1}{4}$ in., twice as long as the calyx. Apparently a passage-form into *V. salicifolia*.

Var. *crassifolia*, *Cheesem.*—Leaves smaller and narrower, 2–3 in. long by $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, linear-lanceolate, very thick and coriaceous, rigid when dry. Racemes equalling the leaves or longer than them, glabrate. Flowers not seen. Calyx-segments oblong-ovate to oblong-lanceolate, acute or subacute. Capsule $\frac{1}{2}$ – $\frac{1}{4}$ in., ovate, acute, twice as long as the calyx. Perhaps a distinct species.

NORTH ISLAND: From Hokianga and Mongonui southwards to Poverty Bay and Taranaki, not uncommon. SOUTH ISLAND: Queen Charlotte Sound, *Banks* and *Solander*. Var. *latisepala*: Great and Little Barrier Islands, Whangarei Heads, *Kirk*! *T. F. C.* Var. *crassifolia*: Nelson, between Karamea and Westport, *W. Townson*! Sea-level to 4000 ft. August–November.

The typical state of this, with large somewhat coriaceous leaves, long racemes of large white flowers, and very large acute capsules, is a most striking plant, and can be recognised at a glance. But there are many intermediates between it and *V. salicifolia* which are difficult to place, and the one which I have called var. *affinis* might be referred to either species. Mr. Kirk's *V. latisepala*, which I have had repeated opportunities of studying at the Little Barrier Island, does not differ from the type except in the violet flowers and shorter often secund racemes, and is best treated as a variety. Mr. Townson's plant from Karamea, which I have called var. *crassifolia*, differs markedly in the smaller and narrower much more coriaceous and rigid leaves, and in the acute calyx-segments, and may prove to be a separate species.

11. **V. amabilis**, *Cheesem. n. sp.*—A tall branching shrub 6–15 ft. high or even more; branches rather slender, terete, quite glabrous or the younger ones minutely puberulous. Leaves spreading, shortly petiolate, 2–4 in. long, $\frac{3}{4}$ –1 in. broad, oblong-lanceolate or elliptic-lanceolate, acute or acuminate, firm but hardly coriaceous, flat, smooth and glabrous, midrib obscurely puberulous above, margins entire. Racemes axillary and opposite near the tips of the branches, 4–6 in. long, slender, lax-flowered, usually attenuate at the tip; pedicels slender, the lower ones often $\frac{1}{3}$ in. long or more. Flowers large, $\frac{1}{3}$ in. diam., white. Calyx deeply 4-partite; segments ovate or ovate-lanceolate, acute, ciliate. Corolla-tube short and broad, equalling the calyx or rather longer than it; limb 4-lobed; lobes oblong, obtuse. Capsule $\frac{1}{4}$ in. long, ovate, acute, twice as long as the calyx.—*V. salicifolia* var. *gracilis*, *T. Kirk, Forest Fl.* t. 120.

Var. **blanda**, *Cheesem.*—Apparently a closely branched shrub. Leaves rather close-set, spreading, often distinctly petiolate, 1–2½ in. long, $\frac{1}{2}$ –¾ in. broad, elliptic-lanceolate or linear-oblong, acute or acuminate, coriaceous, flat, glabrous or puberulous on the margins and midrib above; margins thickened, entire or remotely notched. Racemes 2–3 in. long, often 1 in. broad, dense- or lax-flowered. Flowers large, white, $\frac{1}{4}$ –½ in. diam. Calyx-segments acute. Ripe capsules not seen.

SOUTH ISLAND: Otago—Bluff Hill, *Kirk!* Var. *blanda*: Port Chalmers, *Petrie!* Preservation Inlet, *Kirk!* STEWART ISLAND: Port William, *Lyall!* Paterson's Inlet, *G. M. Thomson!* Ruapuke Island, *H. J. Matthews!*

The plant from the Bluff Hill, which I have taken for the type of the species, was referred by Mr. Kirk to *V. salicifolia*, from which it appears to me to differ altogether in the broader and shorter leaves, more lax-flowered racemes, longer pedicels, much larger flowers, acute calyx-segments, shorter and broader corolla-tube, and larger capsule. It is much nearer *V. macrocarpa*, but the leaves are shorter and broader, the racemes laxer, and the calyx-segments acute. Var. *blanda* has still shorter and broader leaves, with the margins often thickened and peculiarly notched, and the racemes are shorter and denser, but the flowers are very similar. Mr. N. E. Brown informs me that *Lyall's* Port William specimens, mentioned in the Handbook under *V. macrocarpa* and *V. ligustrifolia*, are both referable to it.

12. **V. Lewisii**, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 357. — A handsome closely branched erect shrub 3–6 ft. high; branches stout, terete, clothed with short and fine greyish-white pubescence. Leaves pale-green, spreading, shortly petiolate, 1½–2½ in. long, $\frac{3}{4}$ –1 in. broad, oblong or elliptic-oblong, acute or subacute, rounded or truncate or subcordate at the base, coriaceous, glabrous above, midrib often puberulous beneath, margins edged with a soft white pubescent line. Racemes near the tips of the branches, short and stout, 2–2½ in. long, 1 in. diam., dense-flowered; rhachis, pedicels, and bracts finely pubescent. Flowers large, $\frac{1}{3}$ in. diam. or even more, pale-blue. Calyx 4-partite; segments ovate-

oblong, acute, ciliolate. Corolla with a short and broad funnel-shaped tube and large spreading 4-lobed limb; dorsal and lateral lobes subequal, anterior rather smaller. Capsule $\frac{1}{4}$ in. long, ovate, acute, compressed, about twice as long as the calyx.

SOUTH ISLAND: Canterbury—Downs near the sea in the south of the province, *Armstrong!* near Timaru, *Buchanan!*

Easily distinguished by the softly pubescent branches, pale-green leaves with a pubescent margin, and short broad racemes with very large flowers.

13. **V. chathamica**, *Buch. in Trans. N.Z. Inst.* vii. (1875) 338, t. 13, f. 1.—A prostrate or trailing shrub, with much-branched stems 6–18 in. long; branches numerous, terete, sparingly softly pubescent or almost glabrous. Leaves usually close-set, spreading, sessile or very shortly petiolate, $\frac{1}{2}$ –1 in. long, elliptic or elliptic-oblong, obtuse or subacute, flat, subcoriaceous, glabrous or nearly so. Racemes several towards the tips of the branches, peduncled; flowering portion $\frac{1}{2}$ –1 in. long and almost as broad, broadly oblong, obtuse, dense-flowered; rhachis, pedicels, and bracts pubescent, the latter equalling or exceeding the pedicels. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., purple. Calyx deeply 4-partite; segments ovate-lanceolate, acute. Corolla-tube short, not much longer than the calyx; limb 4-lobed; dorsal and lateral lobes nearly equal, anterior smaller. Capsule about $\frac{1}{5}$ in. long, ovate, subacute, compressed, about twice as long as the calyx.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 528.

Var. **Coxiana**, *Cheesem.*—Branches stouter, suberect. Leaves rather larger and more distant, 1–1 $\frac{1}{2}$ in. long, obovate-oblong or elliptical, rounded at the apex, almost membranous, softly pubescent on both surfaces. Corolla-tube rather longer.—*V. Coxiana*, *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 529.

CHATHAM ISLANDS: Not uncommon on rocks near the sea, *H. H. Travers!* *F. A. D. Cox!* *L. Cockayne!*

A well-marked species, easily recognised by the trailing or prostrate habit and short broad very obtuse racemes. Mr. Kirk distinguished his *V. Coxiana* mainly by the softer and more herbaceous habit and more pubescent leaves and branches, characters which entirely break down when a large suite of specimens is examined.

14. **V. acutiflora**, *Benth. in D.C. Prodr.* x. 460.—A small erect sparingly branched shrub; branches slender, terete, glabrous or the ultimate ones very minutely puberulous. Leaves sessile, spreading, 2–3 in. long, $\frac{1}{6}$ – $\frac{1}{4}$ in. broad, linear-lanceolate, narrowed to an obtuse tip, flat or nearly so, quite smooth and glabrous or the midrib puberulous above, margins entire. Racemes opposite and axillary near the tips of the branches, 2–4 in. long, slender, lax-flowered; rhachis, pedicels, and bracts pubescent or glabrate; pedicels slender, the lowest $\frac{1}{8}$ in. long. Flowers $\frac{1}{8}$ – $\frac{1}{5}$ in. diam. Calyx deeply 4-partite; segments long, ovate-lanceolate, acute,

pubescent or glabrate. Corolla-tube funnel-shaped, short and broad, not nearly equalling the calyx; limb deeply 4-lobed; lobes longer than the tube, oblong, acute or subacute. Capsule $\frac{1}{8}$ in. long, ovate-oblong, acute, about twice as long as the calyx.—*V. ligustrifolia* var. *acutiflora*, *Hook. f. Fl. Nov. Zel.* i. 192.

NORTH ISLAND: Auckland—Kerikeri Falls (Bay of Islands), *Cunningham*, *Colenso*! *Kirk*!

My knowledge of this is confined to a few specimens in Mr. Colenso's herbarium and two or three in Mr. Kirk's. Mr. Colenso's specimens have the pedicels and calyces nearly glabrate; in Mr. Kirk's they are softly pubescent. Mr. N. E. Brown informs me that they differ from the typical *acutiflora* in the rather shorter leaves, smaller flowers, and shorter calyx-segments; but I have little doubt but that they belong to that species. *V. acutiflora* is nearest to *V. ligustrifolia*, but is at once separated by the much narrower and longer leaves and different calyx.

15. *V. angustifolia*, *A. Rich. Fl. Nouv. Zel.* 187.—An erect much-branched glabrous shrub 5–8 ft. high; branches slender, erect, naked below, bark often purplish-brown. Leaves sessile, spreading or deflexed, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, narrow-linear or narrow linear-lanceolate, often falcate, acute, dark-green and channelled above, paler and keeled beneath, quite glabrous, margins entire. Racemes numerous near the tips of the branches, opposite and axillary, erect or spreading, longer than the leaves, 2–5 in. long, slender, tapering, usually rather lax-flowered; rhachis, pedicels, and bracts pubescent; pedicels short, slender. Flowers rather small, $\frac{1}{8}$ in. diam., pale-lilac. Calyx very small, deeply 4-partite; segments oblong, obtuse, ciliate. Corolla-tube tubular, 2 or 3 times as long as the calyx; limb 4-lobed; lobes broadly oblong, obtuse. Capsule about $\frac{1}{8}$ in. long, ovate, acute, compressed, about twice as long as the calyx.—*Raoul, Choix*, 43. *V. squalida*, *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 528. *V. parviflora* var. *angustifolia*, *Hook. f. in Bot. Mag.* t. 5965.

NORTH ISLAND: Hawke's Bay, *Colenso*! *H. Hill*! SOUTH ISLAND: Nelson and Marlborough, abundant, *D'Urville*, *Buchanan*! *Travers*! *Kirk*! *T. F. C.*, &c. December–February.

Very near to *V. parviflora*, and chiefly separated by the smaller size, longer and often drooping leaves, longer and more lax-flowered racemes, and longer corolla-tube. Hooker's plate in the *Botanical Magazine* is excellent.

16. *V. parviflora*, *Vahl. Symb. Bot.* iii. 4.—A much-branched shrub or small tree 6–20 ft. high, with a rounded dome-shaped head; trunk sometimes 2 ft. diam. at the base; branches slender, twiggy, ringed with the scars of the fallen leaves. Leaves sessile, spreading or suberect, 1– $2\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, narrow linear-lanceolate, acute, almost flat or channelled above, keeled beneath, quite smooth, margins entire. Racemes near the tips of the

branches, 1-3 in. long, equalling the leaves or only slightly longer than them, dense-flowered; rhachis, pedicels, and bracts pubescent; pedicels short, rather stout. Flowers small, $\frac{1}{6}$ in. diam., white with a lilac tinge. Calyx short and broad, deeply 4-partite; segments broadly oblong, obtuse, ciliate. Corolla-tube funnel-shaped, about half as long again as the calyx, seldom more; limb 4-lobed; lobes about as long as the tube, broadly oblong or almost orbicular, obtuse. Capsule about $\frac{1}{8}$ in. long, ovate, acute, about twice as long as the calyx.—*A. Cunn. Precur.* n. 378; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 192, and *Handb. N.Z. Fl.* 207 (in part only); *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 526. *V. stenophylla*, *Steud. Nom. Bot.* ed. ii. 760. *V. arborea*, *Buch. in Trans. N.Z. Inst.* vi. (1874) 242.

NORTH ISLAND: Auckland—Whangarei Heads and Taranga Islands, *T. F. C.*; Great Barrier Island, *Kirk*! East Cape district, *Kirk*. Hawke's Bay, *Colenso*! Wellington—Cape Terawhiti and hills near Wellington, *Buchanan*! *Kirk*! SOUTH ISLAND: Marlborough—Queen Charlotte Sound, *Banks* and *Solander*. December–February. Sea-level to 2000 ft.

There is some little doubt as to the plant that Vahl described as *V. parviflora* but it is probably identical with the *V. floribunda* of Banks and Solander's manuscripts and the *V. arborea* of Buchanan. It is chiefly characterized by its large size—sometimes considerably over 25 ft.—small linear-lanceolate leaves, small dense racemes usually not much exceeding the leaves, and short and broad corolla-tube. In the Flora and in the Handbook it is united with *V. angustifolia*, *A. Rich.*, which I take to be quite distinct.

17. *V. leiophylla*, *Cheesem. n. sp.*—A large spreading perfectly glabrous shrub 4-12 ft. high; branches terete. Leaves spreading, sessile or very shortly petiolate, $\frac{3}{4}$ -1 $\frac{1}{4}$ in. long, $\frac{1}{5}$ - $\frac{1}{3}$ in. broad, linear-oblong or narrow oblong-lanceolate, obtuse or acute, flat, smooth, coriaceous, glabrous or the midrib obscurely puberulous above. Racemes towards the tips of the branches, much longer than the leaves, 2-4 in. long, slender; rhachis, pedicels, and bracts puberulous; pedicels longer than the calyx. Flowers rather densely placed, $\frac{1}{6}$ - $\frac{1}{5}$ in. diam. by $\frac{1}{4}$ in. long or more. Calyx small, 4-partite; segments oblong, obtuse. Corolla-tube about twice as long as the calyx; limb equalling or shorter than the tube, 4-lobed; lobes oblong, obtuse, the anterior one rather narrower. Capsule $\frac{1}{5}$ in. long, broadly oblong, subacute, compressed, glabrous, nearly three times as long as the calyx.—*V. parviflora* var. *phillyreæfolia*, *Hook. f. Fl. Nov. Zel.* i. 192.

SOUTH ISLAND: Apparently not uncommon throughout, from Nelson to Otago. Sea-level to 3000 ft. December–February.

This appears to me to be a perfectly distinct species, easily distinguished from *V. parviflora*, under which it was placed by Hooker, by the flat linear-oblong usually obtuse leaves and much larger flowers and capsules. I suspect that *Kirk's V. parviflora* var. *strictissima*, of which I have only seen two im-

mature specimens, is simply a state with more acute leaves and strict suberect racemes. It is frequently named *V. Traversii* in gardens, but is altogether unlike what I take to be the typical state of that species.

18. *V. gracillima*, *Cheesem. n. sp.*—A much-branched glabrous shrub; branches spreading, terete. Leaves spreading, sessile or nearly so, 1–2½ in. long, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, linear-lanceolate or lanceolate, gradually tapering to an acute or acuminate apex, flat, coriaceous, glabrous or puberulous on the midrib above. Racemes numerous towards the tips of the branches, exceeding the leaves, 3–5 in. long, slender; rhachis, pedicels, and bracts puberulous; pedicels slender, longer or shorter than the calyx. Flowers rather densely placed, large, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam. by almost $\frac{1}{3}$ in. long. Calyx 4-partite; segments oblong-ovate, subacute or obtuse, ciliolate. Corolla-tube funnel-shaped, shorter than the limb and often barely exceeding the calyx; limb large, 4-lobed; dorsal and lateral lobes about equal, oblong, obtuse; anterior lobe narrow, linear-oblong, acute. Capsule $\frac{1}{5}$ in. long, broadly oblong, acute, compressed, glabrous, more than double the length of the calyx.—*V. ligustrifolia* var. *gracillima*, *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 527.

SOUTH ISLAND: Nelson—Abundant in the vicinity of Westport, *Dr. Gaze!*
W. Townson!

This differs from *V. acutiflora* in the larger size, longer and more dense-flowered racemes, and especially in the short obtuse or subacute calyx-segments, which are altogether unlike the lanceolate acute or acuminate calyx-segments of *acutiflora*. It agrees with *acutiflora* in the short corolla-tube and large deeply divided limb. From *V. parviflora* it is at once separated by the larger flowers and differently shaped corolla.

19. *V. insularis*, *Cheesem. in Trans. N.Z. Inst.* xxix. (1897) 392.—A small erect or decumbent robust shrub 1–3 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves, pubescent towards the tips. Leaves close-set, spreading or suberect, sessile or very shortly petiolate, $\frac{3}{4}$ –1½ in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, elliptic-oblong or oblong-obovate, subacute or obtusely mucronate, quite entire, very coriaceous, flat or slightly keeled, often glaucous, midrib prominent beneath, margins thickened. Racemes corymbosely branched, peduncled, $\frac{3}{4}$ –1½ in. long, many-flowered, in opposite pairs near the tips of the branches; rhachis and pedicels puberulous; bracts rather large. Flowers $\frac{1}{4}$ in. diam., pale lavender-blue. Calyx short and broad, 4-partite; segments broadly ovate, acute, ciliolate. Corolla-tube broad, about half as long again as the calyx; limb 4-lobed. Capsule ovoid, turgid, acute, rather more than twice as long as the calyx.

NORTH ISLAND: Three Kings Islands, rocky places on both the Great King and the Western King, but not common, *T. F. C.* November–December.

This has the corymbose inflorescence of *V. diosmæfolia*, but differs altogether in the stout spreading or decumbent habit, much larger broader leaves, and in the calyx and corolla.

20. *V. venustula*, Col. in Trans. N.Z. Inst. xxvii. (1895) 393.—A small compact bushy shrub 6–9 in. high; branchlets short, numerous. Leaves close-set, decussate, spreading, shortly petioled, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{4}$ in. broad, oblong or elliptic-ovate, acute, coriaceous, flat or slightly concave, not keeled, dark-green and glabrous; midrib prominent beneath, excurrent; margins entire. Racemes terminal, much branched, forming a terminal many-flowered corymb 2 in. diam.; pedicels slender, puberulous; bracts lanceolate, acute, equalling the pedicels. Flowers white, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Calyx deeply 4-partite; segments ovate or ovate-lanceolate, acute. Corolla-tube funnel-shaped, rather longer than the calyx; limb 4-lobed; lobes subequal, broadly ovate, obtuse. Capsule $\frac{1}{4}$ in. long, broadly ellipsoid, obtuse, more than twice as long as the calyx.

NORTH ISLAND: Hawke's Bay—Eastern side of the Ruahine Range, County of Waipawa, A. Olsen!

Of this species I have only seen two small scraps, but these both agree in the very distinct character of the inflorescence, which forms a dense terminal corymb similar to that of *V. diosmæfolia*, from which plant it differs totally in the leaves, calyx, and corolla. Mr. N. E. Brown, who has examined some specimens forwarded to Kew by Colenso, also states that it is "a very distinct species near to *V. diosmæfolia*." It is curious that so far it has escaped the notice of any collector except Mr. Olsen.

21. *V. diosmæfolia*, R. Cunn. in Bot. Mag. sub. t. 3461.—A small much-branched shrub, usually from 2–5 ft. high, but sometimes attaining a height of 15 ft., with a slender trunk 4–6 in. diam.; branches glabrous or puberulous, ringed with the scars of the fallen leaves. Leaves close-set, spreading or suberect, shortly petioled, $\frac{1}{2}$ –1 in. long, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad, linear-oblong or oblong-lanceolate to elliptic-oblong, straight or slightly falcate, acute, entire or with 2–4 minute incisions on each side near the apex, coriaceous, dark-green above, paler and often slightly keeled by the midrib beneath, veinless. Racemes about 1 in. long, peduncled, corymbosely branched, usually near the tips of the branches, but sometimes lateral; rhachis and pedicels slender, puberulous; bracts shorter than the pedicels. Flowers about $\frac{1}{4}$ in. diam., white or pale lavender-blue. Calyx usually 3-partite with the upper segment broader and 2-fid, rarely equally 4-partite. Corolla-tube short, funnel-shaped, not much longer than the calyx; limb 4-lobed, the posticous lobe the largest. Capsule $\frac{1}{6}$ in. long, ovoid, turgid, about twice as long as the calyx.—A. Cunn. Precur. n. 381; Raoul, Choix, 43; Hook. f. Fl. Nov. Zel. i. 193; Handb. N.Z. Fl. 209; Armstr.

in *Trans. N.Z. Inst.* xiii. (1881) 351. *V. diosmæfolia* var. *trisepala*, *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 525; *Hook. f. Bot. Mag.* t. 7539. *V. trisepala*, *Col. in Trans. N.Z. Inst.* xv. (1883) 324.

NORTH ISLAND: Auckland—In various localities from the North Cape to Whangarei, but far from common. Hawke's Bay—North end of Te Kaweka Mountain, *A. Hamilton*!

The distinguishing characters of this well-known species are the narrow acute leaves, truly corymbose inflorescence, usually 3-partite calyx with obtuse segments, and comparatively short corolla-tube. Its nearest ally is *V. Menziesii*, which is separated mainly by the equally 4-partite calyx with acute segments, long corolla-tube, and larger capsules. Mr. Kirk has divided it into 2 varieties; one, which he considered to be the typical state, with rather broader and shorter entire leaves and a 4-partite calyx; the other, which answers to the *V. trisepala* of Colenso, and which he called var. *trisepala*, with narrower incised leaves and a 3-partite calyx. But entire or incised leaves occur in both forms, so that the difference between the two varieties really consists in the number of calyx-segments alone, or rather in the extent to which the two upper sepals are united. It seems hardly worth while keeping up a distinction founded on such a slight character, but if it is retained the form with a 3-partite calyx should be considered as the type, seeing that it extends through the whole range of the species, whereas the form with the calyx 4-partite is rare in the wild state. Cunningham does not mention the number of calyx-segments in the original description, but both Bentham (*D.C. Prodr.* x. 460) and Hooker (*Fl. Nov. Zel.* i. 193) give the number as 3.

22. *V. Menziesii*, *Benth. in D.C. Prodr.* x. 461.—A compact perfectly glabrous shrub 3–8 ft. high; branches terete, leafy. Leaves usually rather close-set, shortly petiolate, suberect or spreading, $\frac{1}{2}$ –1 in. long, $\frac{1}{5}$ – $\frac{1}{4}$ in. broad, lanceolate to elliptic-lanceolate or linear-oblong, acute, rigid, coriaceous, flat or slightly keeled beneath. Racemes crowded near the tips of the branches, 1–2 in. long, peduncled, corymbosely branched, very rarely simple, erect or erecto-patent; rhachis slender, puberulous; pedicels variable in length. Flowers white or pale-lilac, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate-oblong, subacute or obtuse, ciliate. Corolla-tube nearly twice as long as the calyx, funnel-shaped; lobes oblong, obtuse or subacute, the anterior one narrower than the rest. Capsule ovoid, acute, more than twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i. 193. *V. Colensoi*, *Hook. f. Handb. N.Z. Fl.* 209 (*in part only*).

Var. *divaricata*, *Cheesem.*—More sparingly branched; the branches slender, spreading. Leaves narrower, lanceolate, acute, often falcate, spreading or deflexed, not so closely placed nor so coriaceous as in the type. Racemes copiously corymbosely branched. Calyx-segments narrower, ovate-lanceolate, acute. Has much of the habit and general appearance of *V. diosmæfolia*, but differs markedly in the longer corolla-tube and narrower acute calyx-segments.

SOUTH ISLAND: Marlborough—Pelorus and Tinline Valleys, *J. H. Mac-malion*! Nelson, *Bidwill*! Maitai Valley, *Kirk*! *T. F. C.*; Lake Rotoiti, *Monro*, *T. F. C.*; Hanmer Plains, *T. F. C.*; Clarence Valley, *Kirk*! Otago—

Dusky Bay, Menzies. Sea-level to 3000 ft. December-February. Var. *divaricata*: Not uncommon in the Pelorus and Rai Valleys, Marlborough, Macmahon!

V. Menziesii was founded by Bentham on specimens collected by Menzies in Dusky Bay in 1791. In the Flora Hooker united Menzies's plant with another gathered by Bidwill in the vicinity of Nelson; but in the Handbook he referred Menzies's specimens to *V. elliptica*, and associated Bidwill's specimens with a plant gathered on the Ruahine Mountains by Colenso, and with others collected in various localities in the South Island by Sinclair, Travers, and Haast, giving the name of *Colensoi* to the species thus described. But as Colenso's plant was described as having simple racemes and glaucous leaves, while Bidwill's (judging from a specimen in my possession) had compound racemes and dark-green leaves, this arrangement did not appear at all satisfactory. At my request Mr. N. E. Brown has carefully examined the types in the Kew Herbarium, and reports that Menzies's and Bidwill's specimens undoubtedly belong to one and the same species, and that Hooker was in error in referring the former to *V. elliptica*. He further states that Colenso's Ruahine Mountain plant is totally different, and is the species subsequently described by Colenso under the name of *V. Hillii*. Under these circumstances, the name of *V. Menziesii* must be restored, the species being characterized by the narrow acute rigid leaves, corymbosely branched racemes, 4-partite calyx with subacute segments, and a corolla-tube almost twice as long as the calyx. Its nearest ally is *V. diosmæfolia*, to which my var. *divaricata* is very close indeed. A plant collected by Petrie at the foot of Ruapehu, and by Messrs. Hill and Andrew on the Ruahine Range, is doubtfully referred to *V. Menziesii* for the present, but the specimens are not sufficient for precise determination.

23. *V. Colensoi*, Hook. f. *Handb. N.Z. Fl.* 209, as regards the North Island specimens only.—A small erect or spreading perfectly glabrous shrub 9–18 in. high; branches leafy above, ringed with the scars of the fallen leaves below. Leaves rather close-set, sub-erect or spreading, sessile or narrowed into a very short broad petiole, $\frac{3}{4}$ –1½ in. long, $\frac{1}{5}$ –½ in. broad, linear-oblong or oblong-lanceolate, acute or subacute, entire or remotely incised, coriaceous, flat or nearly so, dark-green above, glaucous beneath; midrib stout, prominent beneath. Racemes few near the tips of the branches, slightly exceeding the leaves, slender, peduncled, simple or sparingly branched, many-flowered; rhachis slender, puberulous or glabrate; bracts exceeding the short pedicels. Flowers white, ½ in. diam. Calyx deeply 4-partite; segments ovate-lanceolate, acute. Corolla-tube broadly funnel-shaped, shorter than the calyx; limb rather longer than the tube, 4-lobed; lobes spreading or reflexed, narrow-ovate, subacute. Stamens short, not exceeding the corolla-lobes. Capsule narrow-ovate, acute, compressed, about twice as long as the calyx.—*V. Hillii*, Col. in *Trans. N.Z. Inst.* xxviii. (1896) 606; Kirk, l.c. 524.

NORTH ISLAND: Hawke's Bay—By the Ngaruroro River at Kuripapango; between the Rangitikei ford and Erewhon, H. Hill! A. Hamilton! D. Petrie! Ruahine Mountains, Colenso. SOUTH ISLAND: Otago, locality not stated, Buchanan!

The *V. Colensoi* of the Handbook, as already stated, was based upon a mixture consisting of specimens collected on the Ruahine Mountains by Colenso, on *V. Menziesii*, and two or three other species. If the name is to be retained at all, it should clearly be restricted to Colenso's plant, which Mr. N. E. Brown informs me is identical with that subsequently described by Colenso under the name of *V. Hillii*. It can be distinguished by the small size, glaucous leaves, slender simple or sparingly branched racemes, narrow acute calyx-segments, and short corolla-tube. The *V. Colensoi* of the *Botanical Magazine* (t. 7296) is quite a different plant, but I have seen no specimens, and it does not seem to be known except in cultivation in England.

24. *V. rigidula*, *Cheesem. n. sp.*—A small much-branched erect perfectly glabrous shrub 6–24 in. high, rarely more; branches stout, erect, scarred, almost black, leafy at the tips. Leaves close-set, almost imbricating, suberect or rarely spreading, petiolate, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, linear-oblong or narrow obovate-oblong, acute or subacute, very thick and coriaceous, rigid, dark-green and concave above, glaucous and keeled by the thick and prominent midrib beneath; margins thickened, entire. Racemes or spikes 2–4 near the tips of the branches, about equalling the leaves, usually branched, dense-flowered; rhachis stout, pubescent; pedicels wanting or the lower flowers very shortly stalked; bracts ovate-oblong, obtuse, almost as long as the calyx. Flowers small, white, $\frac{1}{5}$ in. diam. Calyx 4-partite; segments oblong, obtuse, ciliolate. Corolla-tube tubular, nearly twice as long as the calyx; limb rather short, not equalling the tube; lobes subequal, oblong, obtuse. Stamens slightly exceeding the corolla. Capsule small, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, ovoid-oblong, acute or subacute, barely twice as long as the calyx.

SOUTH ISLAND: Marlborough—Pelorus and Rai Valleys (on rocks by the side of streams), Mount Duppa, Maungatapu, *J. H. Macmahon!* Nelson—Wairau Gorge, *T. F. C.* Sea-level to 4000 ft. December–February.

Apparently a very distinct little plant. It has somewhat of the habit and general appearance of the *V. Colensoi* of this work (*V. Hillii*, Colenso), but in reality differs altogether in the smaller and closer-set petiolate suberect keeled leaves, shorter and stouter dense-flowered racemes, smaller flowers, obtuse calyx-segments, and longer corolla-tube with a shorter limb.

25. *V. rupicola*, *Cheesem. n. sp.*—An erect sparingly branched shrub 1–4 ft. high; branches stout, erect or spreading, glabrous or the younger ones faintly bifariously pubescent. Leaves not very close-set, spreading, petiolate, $\frac{1}{2}$ –1 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, linear-oblong or elliptic-oblong or linear-obovate, obtuse or subacute, gradually narrowed into the rather long petiole, flat or slightly concave, coriaceous, glaucous when fresh, quite entire, midrib prominent beneath. Racemes or spikes lateral or towards the tips of the branches, much exceeding the leaves, 1–2 in. long, peduncled, usually trichotomous, very rarely simple; rhachis stout, strict,

puberulous or almost glabrate; pedicels wanting or the lower flowers alone shortly stalked; bracts oblong-ovate, obtuse, large, often exceeding the calyx. Flowers crowded on the branches of the raceme, about $\frac{1}{4}$ in. diam. Calyx 4-partite; segments oblong, obtuse, with pale membranous ciliolate margins. Corolla-tube about half as long again as the calyx; limb equalling the tube or nearly so; lobes oblong-ovate, obtuse or subacute. Capsule broadly oblong, obtuse or subacute, about $\frac{1}{4}$ in. long, not twice the length of the calyx.

SOUTH ISLAND: Marlborough—Awatere Valley, *Sinclair*! Kaikoura Mountains, *Buchanan*! gorge of the Conway River, *Cockayne*!

A well-marked plant, easily recognised by the peculiar habit, spreading and long-petioled linear-obovate glaucous leaves, trichotomous racemes much longer than the leaves, almost sessile flowers, and large bracts. Its nearest ally is probably *V. Colensoi*.

26. *V. lævis*, *Benth. in D.C. Prodr.* x. 461.—A small perfectly glabrous densely branched shrub 1–5 ft. high; branches stout, erect, densely leafy above, below ringed with the scars of the fallen leaves; bark black. Leaves decussate, close-set, erect and appressed, rarely further apart and spreading, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, ovate-oblong or obovate-oblong, obtuse or acute or apiculate, abruptly narrowed into a short thick petiole, very thick and coriaceous, rigid, concave above, keeled at the back; midrib stout, prominent beneath, usually excurrent at the tip; margins entire. Racemes 2–4 near the ends of the branchlets, corymbosely branched, rarely simple, $\frac{3}{4}$ –1½ in. long, densely flowered; rhachis stout, pubescent; bracts small, oblong-ovate, coriaceous, usually exceeding the lower pedicels. Flowers white, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments oblong or oblong-ovate, obtuse. Corolla-tube rather broad, less than twice as long as the calyx; segments oblong or oblong-ovate, obtuse. Capsule ovate or ovate-oblong, acute, about twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i. 194; *Handb. N.Z. Fl.* 209; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351. (?) *V. azurea*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 277.

NORTH ISLAND: Mount Hikurangi, *Adams* and *Petrie*! Mount Egmont, *T. F. C. Tongariro*, *Bidwill*, *Capt. G. Mair*! Ruapehu, *H. Tryon*! *H. Hill*! Ruahine Mountains, *Colenso*! *H. Hill*! *A. Hamilton*! Tararua Mountains, *Buchanan*! SOUTH ISLAND: Marlborough—Mount Duppa, *Macmahon*! 2500–5000 ft. December–February.

The typical state of this is distinguished by the close-set imbricating and more or less appressed leaves, which are keeled at the back, but not truncate or subcordate at the base as in *V. buxifolia*, and by the usually corymbosely branched racemes. This latter peculiarity, Mr. N. E. Brown assures me, is well shown by the type specimens at Kew. It has been recorded from many districts in the South Island, from Nelson to Otago, but I have not seen any specimens that satisfactorily match those from the North Island. Most are referable to

Armstrong's *V. monticola*, which is a larger plant, with larger laxer foliage, and longer always simple racemes. Others correspond with the *V. Cockayneana* of this work, which has flatter and more obtuse glaucous leaves, black when dry, simple very pubescent racemes, and larger flowers. States of *V. Traversii*, with more closely placed leaves than usual, have also had the name of *V. lævis* applied to them.

27. *V. elliptica*, *Forst. Prodr.* n. 10.—A copiously branched shrub or small tree 5–20 ft. high; branches terete, ringed with the scars of the fallen leaves, the younger ones more or less hoary with short soft white hairs, which are often arranged in two opposite lines. Leaves petiolate, close-set, horizontally spreading, uniform, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, elliptic-oblong or obovate-oblong, apiculate, slightly truncate at the base, pale-green, coriaceous, nerveless, margins edged with a white pubescent line, midrib prominent beneath; petioles short, erect and appressed to the branch. Racemes numerous near the tips of the branches, short, 1 – $1\frac{1}{2}$ in. long, erect, glabrous or nearly so, laxly 4–12-flowered; pedicels slender, each with a small lanceolate bract at the base. Flowers large, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam., white or white with purple lines, sweet-scented. Calyx $\frac{1}{8}$ – $\frac{1}{4}$ in. long, 4-partite; segments ovate, acute or acuminate. Corolla-tube slightly longer than the calyx; limb large, 4-lobed; lobes spreading, ovate. Capsule $\frac{1}{4}$ in. long, broadly ovate, acute, twice as long as the calyx.—*A. Rich. Fl. Nouv. Zel.* 189; *A. Cunn. Precur.* n. 379; *Raoul, Choix*, 43; *Hook. f. Fl. Antarct.* i. 58; *Fl. Nov. Zel.* i. 193; *Handb. N.Z. Fl.* 209; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk in Trans. N.Z. Inst.* xxviii. 526. *V. decussata*, *Ait. Hort. Kew*, i. 20; *Bot. Mag.* t. 242.

Var. *odora*, *Cheesem.*—Smaller, 2–4 ft. high, sparingly fastigiate branched. Leaves smaller and more closely placed, horizontally spreading, $\frac{1}{2}$ – $\frac{2}{3}$ in. long, about $\frac{1}{4}$ in. broad, elliptic-ovate, rigid, somewhat concave. Flowers large, white, $\frac{1}{3}$ in. diam., very sweet-scented. Calyx-segments obtuse.—*V. odora*, *Hook. f. Fl. Antarct.* i. 62, t. 41.

SOUTH ISLAND: Western coast from West Wanganui and Cape Foulwind southwards; east and southern coasts of Otago. CHATHAM ISLANDS: *H. H. Travers*! *Capt. G. Mair*! STEWART ISLAND: Not uncommon on the coast, also on the islands in Foveaux Strait and on The Snares. AUCKLAND AND CAMPBELL ISLANDS: Abundant. Var. *odora*: Auckland Islands, in woods near the sea, not uncommon, *Sir J. D. Hooker*. December–January.

A most distinct species, easily recognised by the pale-green elliptic apiculate petiolate leaves, and very large white flowers. It is also a native of the Falkland Islands, Fuegia, and South Chili. I have ventured to refer to it the *V. odora* of *Hook. f.*, a plant which is only known by the description and plate in the "Flora Antarctica." In the Handbook Hooker reduced it to *V. buxifolia*, a view which was also adopted by Kirk (*Trans. N.Z. Inst.* xxviii. 524). But judging from the description and plate, for I have seen no authentic specimens, it cannot possibly be placed with that plant, which differs altogether in habit, in the smaller densely imbricated shining leaves, in the shorter racemes with large concave bracts, and in the smaller flowers, which I have never

observed to be fragrant. On the other hand, it agrees with *V. elliptica* in habit, in the shape of the leaves, in the crowded terminal racemes, and in the large white fragrant flowers, differing mainly in the smaller size and more rigid concave leaves. Mr. N. E. Brown, who has kindly examined the types for me, states that the plant is quite distinct from *V. buxifolia*, and in his opinion should be regarded as a distinct species endemic in the Auckland Islands.

28. **V. Matthewsii**, *Cheesem. n. sp.*—An erect glabrous shrub 2–4 ft. high or more; branches stout, terete, often purplish-red when young. Leaves close-set, sessile, suberect or spreading, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, oblong or elliptic-oblong, obtuse or subacute, rounded at the base, thick and coriaceous, flat, quite entire. Racemes near the tips of the branches or rarely lateral, large, 2–4 in. long including the stout naked peduncle, obtuse or tapering, densely many-flowered; rhachis stout, pubescent; pedicels very short, stout; bracts ovate or ovate-lanceolate, acute or obtuse. Flowers large, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. or more, white or purplish. Calyx deeply 4-partite; segments oblong or oblong-ovate, obtuse, often with purplish margins. Corolla-tube twice as long as the calyx; limb spreading, 4-lobed; lobes subequal, broadly oblong, rounded at the tip. Ovary pubescent at the tip. Capsule $\frac{1}{4}$ in. long, elliptic-oblong, obtuse or subacute, about twice as long as the calyx.

SOUTH ISLAND: Canterbury—Southern Alps, *Haast! Armstrong!* Otago—Milford Sound, *Enys!* Humboldt Mountains, *H. J. Matthews!*

A handsome plant, often cultivated in gardens in the South Island as a variety of *V. Traversii*, but a much stouter plant with a different habit of growth, and with thicker and more coriaceous oblong obtuse leaves, and larger and stouter racemes with much larger flowers. It is nearer to *V. Balfouriana*, but that species has smaller leaves, acute calyx-segments, and a corolla-tube hardly longer than the calyx.

29. **V. Balfouriana**, *Hook. f. Bot. Mag. t. 7556.*—“An erect glabrous shrub 3 ft. high, with dark-brown bark and suberect flexuous purplish-brown or reddish branches. Leaves subsessile, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, in loosely approximate pairs, spreading and decurved, elliptic-ovate, obtuse or subacute, quite entire, coriaceous, bright pale-green and shining above, with narrow red-brown margins. Racemes opposite, axillary from the base of the last year's shoots, 2–3 in. long, erecto-patent, very many-flowered, peduncle stout, flowers crowded; pedicels about as long as the calyx, puberulous; bracts ovate, obtuse or acute, about as long as the pedicel. Sepals about $\frac{1}{8}$ in. long, acute, ciliate. Corolla pale violet-blue, $\frac{1}{2}$ in. diam., tube as long as the sepals; lobes rounded, three upper subequal, the lower narrower. Stamens as long as the corolla-lobes or shorter; anthers red-brown, bases of cells rounded. Capsule ellipsoid, about one-third longer than the sepals or less.”

Apparently a distinct species. It was raised at the Royal Botanical Gardens, Edinburgh, from seeds sent from New Zealand, but from what locality is not stated. Its nearest ally is probably *V. Traversii*, from which it differs in the smaller leaves with red-brown margins, in the usually longer racemes, in the much larger violet (not white) flowers, in the longer acute sepals, which almost equal the short corolla-tube, and in the shorter and broader capsule. I have seen no specimens, and have consequently reproduced the original description.

30. *V. Darwiniana*, Col. in *Trans. N.Z. Inst.* xxv. (1893) 332.

—A small compact rounded shrub; branches numerous, terete, glabrous or the younger ones faintly pubescent; bark brownish-green. Leaves rather laxly placed, decussate, sessile or nearly so, horizontally spreading, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad, ovate-lanceolate or narrow elliptic-oblong, acute, rather thick and coriaceous, glaucous on both surfaces, slightly concave above, not keeled beneath; margins entire, minutely ciliolate when young. Racemes 2–4 near the tips of the branches, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, dense-flowered, tapering to the tip; rhachis, pedicels, and bracts pubescent; pedicels about as long as the calyx or shorter. Flowers white, $\frac{1}{4}$ in. diam. Calyx 4-partite; segments broadly ovate, obtuse or subacute. Corolla-tube short and broad, about as long as the calyx, throat pubescent within; lobes longer than the tube, broadly oblong, obtuse. Ovary pubescent or glabrous. Capsule ovate, acute, compressed, more than twice as long as the calyx. *V. glaucophylla*, Cockayne in *Trans. N.Z. Inst.* xxxi. (1899) 422.

NORTH ISLAND: Hawke's Bay—Hills in the interior, Colenso! SOUTH ISLAND: Nelson—Mountains behind Hanmer, Cockayne! Canterbury—Craigieburn Mountains, Cockayne!

This is probably nearer to some of the forms included under *V. Traversii* than to any other, but can be separated by the more distant not keeled glaucous leaves, tapering racemes, and short corolla-tube hairy in the throat. Mr. Cockayne's plant has rather smaller and narrower leaves than Colenso's type, but otherwise there is little difference between them.

31. *V. Traversii*, Hook. f. *Handb. N.Z. Fl.* 208 (*in part*).—

A small perfectly glabrous shrub, usually forming a round compact bush 2–5 ft. diam.; branches terete, densely clothed with decussate leaves. Leaves spreading, petiolate or subsessile, uniform in size and shape, $\frac{1}{2}$ –1 in. long, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad, elliptic-oblong or elliptic-lanceolate to linear-oblong, acute or subacute, usually narrowed to an acute base, coriaceous, channelled above, more or less keeled beneath, nerveless, margins entire, midrib usually strong. Racemes near the tips of the branches, 1–3 in. long, long and tapering or short and obtuse, simple, many-flowered; rhachis slender, puberulous; pedicels variable in length; bracts small. Flowers white, $\frac{1}{4}$ in. diam. Calyx 4-partite; segments broadly oblong or ovate, obtuse, margins often membranous, ciliolate. Corolla-tube from slightly longer to nearly twice as long as the calyx; limb 4-lobed;

lobes subequal, oblong, obtuse. Capsule elliptic-ovate, acute, compressed, twice as long as the calyx.—*Bot. Mag.* t. 6390, and t. 7296, f. 5; *Masters in Gard. Chron.* 1873, p. 1046; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351.

Var. fallax, Cheesem.—Not so closely branched, often reddish-brown when fresh. Leaves more laxly placed, sessile, linear-oblong or oblong-lanceolate, acute or obtuse, flat or nearly so. Racemes lax-flowered; pedicels very short. Corolla-tube short, only slightly exceeding the calyx.

Var. elegans, Cheesem.—Branches slender. Leaves more laxly placed spreading, narrow linear-oblong, flat. Racemes oblong, obtuse; pedicels long, slender. Calyx small. Corolla-tube long, narrow, two or three times the length of the calyx.

SOUTH ISLAND: Abundant in mountain districts from Nelson to Otago. 500–3500 ft. December–February.

There is much confusion as to the limits of this species. The description given in the Handbook evidently includes more species than one; but without an examination of the material which Hooker had before him it is not easy to decide which should be taken as the type. I have selected the plant figured in the Botanical Magazine (t. 6390), which is also identical with that described by Dr. Masters in the *Gardeners' Chronicle*. It appears to have been included in the original description, has a wide distribution in the South Island, and is the form usually cultivated under the name of *V. Traversii*; but I am unable to say whether it was actually collected by Travers. On the other hand, Mr. N. E. Brown, who has lately examined the whole of the New Zealand *Veronica* in the Kew Herbarium, is of opinion that my var. *elegans* should be regarded as the type. It was collected by both Travers and Haast, but seems to be a local plant, all the specimens I have seen having come from the Canterbury Provincial District. It differs conspicuously from the Botanical Magazine plant in the long and slender corolla-tube, in that and other respects approaching *V. leiophylla*. Probably the two plants are distinct, but I hesitate to describe them as such until more conclusive evidence has been obtained.

32. **V. subalpina, Cockayne in Trans. N.Z. Inst.** xxxi. (1899) 420.—A much-branched erect shrub 3–6 ft. high; branches suberect or spreading, terete, glabrous or the younger ones minutely puberulous, leafy above, below ringed with the scars of the fallen leaves. Leaves spreading, sessile, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, lanceolate or oblong-lanceolate, broadest below the middle, acute or subacute, subcoriaceous, pale glistening green, slightly concave above when fresh, flat when dry, margins entire. Racemes 2–4 near the tips of the branches, equalling the leaves or longer than them, 1–2 in. long, simple, dense- or lax-flowered; rhachis slender, puberulous; lower pedicels slender, usually exceeding the calyx; bracts small. Calyx deeply 4-partite; segments ovate-lanceolate or ovate-oblong, acute, margins ciliolate. Corolla-tube short and broad, hardly exceeding the calyx; limb longer than the tube, 4-lobed; lobes oblong, obtuse. Capsule $\frac{1}{4}$ in. long, ovate, acute, compressed, about twice as long as the calyx.

SOUTH ISLAND: Nelson—Clarence Valley, *Kirk! T. F. C.*; Lake Tennyson, *T. F. C.* Canterbury—Arthur's Pass and Upper Waimakariri, *Enys! Kirk!*

T. F. C.; Rakaia Valley, *Haast*! Mount Cook district, *T. F. C.* Westland—*Kelly's Hill*, *Jackson's, &c.*, *Petrie*! *Cockayne*! Otago—*Hector* and *Buchanan*; *Lake Harris*, *Kirk*! Clinton Valley, *Petrie*! 2500-4500 ft. December-March.

Very close to *V. Traversii*, but I think sufficiently distinct in the different habit, flatter lanceolate leaves, which taper from below the middle to an acute or subacute apex, acute calyx-lobes, and short and broad corolla-tube. Mr. N. E. Brown informs me that specimens collected by Haast and Hector and Buchanan exist in the Kew Herbarium, but were referred to *V. Traversii* by Hooker.

33. *V. vernicosa*, *Hook. f. Handb. N.Z. Fl.* 208.—A small usually rather stout erect or decumbent shrub 1-3 ft. high; branches spreading, often in the same plane, pubescent at the tips or almost glabrous. Leaves close-set, decussately inserted but often becoming almost distichous from the twisting of the petioles, spreading, petiolate, $\frac{1}{4}$ - $\frac{2}{3}$ in. long, $\frac{1}{8}$ - $\frac{1}{3}$ in. broad, obovate or obovate-oblong, obtuse or apiculate, suddenly contracted into the short petiole, coriaceous, flat or slightly concave; midrib impressed above, thick and prominent beneath, excurrent; margins entire, sometimes ciliolate when young. Racemes few or many near the tips of the branches, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, simple, usually dense-flowered but sometimes lax; rhachis, pedicels, and bracts pubescent; pedicels variable in length, sometimes almost wanting, at other times equalling the bracts. Flowers white, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam. Calyx 4-partite; segments oblong, obtuse; margins usually pale, membranous, ciliolate. Corolla-tube short and broad, usually about as long as the calyx, rarely slightly exceeding it; limb 4-lobed, longer than the tube; lobes spreading, ovate-oblong, obtuse. Capsule ovate, acute, compressed, glabrous, rather more than twice as long as the calyx.—*Kirk in Trans. N.Z. Inst.* xxviii. (1896) 526. *V. canterburiensis*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 355.

Var. *gracilis*, *Cheesem.*—Much more slender and more sparingly branched; branches widely divaricating. Leaves distichously spreading, narrower and less coriaceous than in the type, linear-obovate or linear-oblong to oblong-obovate, obtuse or subacute. Racemes 1-4 near the tips of the branches, 1-2 in. long, very slender and lax-flowered; pedicels longer. Capsule narrow-ovate, acute.

Var. *multiflora*, *Cheesem.*—Racemes very numerous, forming a crowded mass near the tips of the branches, slender, tapering, many-flowered.—(?)*V. Grayi*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 354.

SOUTH ISLAND: Mountain districts in Nelson, Marlborough, Canterbury, and Westland, not uncommon. Sea-level to 4500 ft. December-February.

A well-marked species, recognised without much difficulty by the spreading habit and numerous short and broad leaves, which, although decussately inserted, usually spread in a more or less distichous manner through a twist in the petiole. In the typical state the racemes are generally numerous and rather short and dense-flowered; but in var. *gracilis*, which is a shade-form most common by the side of streams at low elevations, the racemes are usually fewer and much more slender and lax-flowered. Var. *multiflora* I have only seen in cultivation. It is known in gardens as *V. Grayi*, but I am not quite sure that it is the plant described by Armstrong under that name. Armstrong described his *V. canter-*

huriensis as having membranous leaves and the racemes in pairs at the end of the branches, so that probably he had var. *gracilis* in mind when he described the species; but for many years he applied the name to the typical form in the Botanical Gardens at Christchurch.

34. **V. obovata**, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 502.—

An erect sparingly branched glabrous shrub 4–5 ft. high; branches stout, erect, ringed with the scars of the fallen leaves. Leaves shortly petioled, erect or suberect, laxly imbricating, $\frac{3}{4}$ –1 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, narrow-obovate, obtuse, gradually narrowed into the short broad flat petiole, slightly concave when fresh, thick and coriaceous, margins entire. Racemes 2 or 3 near the tips of the branches, 1–2 in. long, slender, erect, lax-flowered; rhachis puberulous; pedicels short; bracts small, ovate, acute. Flowers white, $\frac{1}{5}$ in. diam. Calyx 4-partite; segments ovate-oblong, obtuse. Corolla-tube short and broad, hardly longer than the calyx; limb 4-lobed; lobes spreading, oblong, obtuse. Ripe capsules not seen.

SOUTH ISLAND: Canterbury—Broken River, *Kirk*! Mount Cook district, *T. F. C.* Otago—Upper Hawea, *Petrie*! Mount Earnslaw, *Cockayne*! 2000–4500 ft.

The above description is based on Kirk's type specimens from the Broken River. My own specimens from the Mount Cook district, and Petrie's and Cockayne's from Otago, have rather smaller and less obovate leaves and longer racemes, and may be referable to *V. monticola*, if, indeed, the two species should not be combined.

35. **V. monticola**, *Armstr. in Trans. N.Z. Inst.* xiii. (1881)

354.—A much-branched glabrous shrub 2–5 ft. high; branches erect or spreading, densely leafy above, ringed with the scars of the fallen leaves below; bark brown. Leaves close-set, more or less imbricate, suberect or spreading, $\frac{2}{3}$ –1 in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, obovate-oblong or elliptic-oblong, obtuse or subacute, narrowed into a very short thick petiole, thick and coriaceous, slightly concave above, somewhat rounded but not keeled beneath; midrib impressed beneath when dry. Racemes near the tips of the branches, longer than the leaves, 1–1 $\frac{1}{2}$ in. long, dense-flowered; rhachis puberulous; pedicels very short, stout; bracts ovate-lanceolate, subacute. Flowers white, $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments oblong-ovate, obtuse or subacute. Corolla-tube short and broad, barely longer than the calyx; limb 4-lobed; lobes ovate, spreading. Capsule ovate-oblong, acute, about twice as long as the calyx.

SOUTH ISLAND: Mountain districts from Nelson to Otago, not uncommon. 2000–4500 ft. December–February.

This is the plant to which the name of *lævis* is usually applied in the South Island, but I believe erroneously, the true *lævis* having smaller and more rigid keeled leaves and a corymbose inflorescence. It agrees with an authentic specimen of *V. monticola* in Kirk's herbarium, but differs in several

respects from Armstrong's original description. Kirk's *V. obovata* only differs in the more truly obovate leaves, and I have little doubt that it will ultimately be merged with that species.

36. **V. Cockayniana**, *Cheesem. n. sp.*—A small densely branched shrub 2–4 ft. high; branches rather stout, densely leafy above, conspicuously marked with the scars of the fallen leaves below; younger ones more or less bifariously pubescent. Leaves close-set, decussate, suberect or spreading, shortly petiolate, uniform in size and shape, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, oblong or elliptic-oblong or obovate-oblong, obtuse, flat or slightly concave, thick and coriaceous, often black on the upper surface when dry, glaucous beneath; midrib puberulous above, thick and prominent beneath; margins entire. Racemes 2–4 near the tips of the branches, rather longer than the leaves, $\frac{1}{2}$ –1 in. long, simple, usually lax-flowered; rhachis, pedicels, and bracts pubescent. Flowers white, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Calyx deeply 4-partite; segments ovate-oblong, obtuse; margins pale, membranous, ciliolate. Corolla-tube short and broad, equalling the calyx or slightly longer; limb 4-lobed; lobes longer than the tube, broad, rounded, veined. Capsule $\frac{1}{2}$ in. long, ovate, acute, twice as long as the calyx.

SOUTH ISLAND: Nelson—Mount Lyell and Mount Murchison, *Townson!* near Reefton, *R. W. Raithby!* Otago—Humboldt Mountains, *Cockayne!* Clinton Valley, *Petrie!* 2000–4500 ft. December–February.

I look upon this as a perfectly distinct species, perhaps nearest to *V. laevis*, but easily distinguished by the pubescent branchlets, flatter and more spreading leaves glaucous beneath, by the simple lax-flowered racemes, and larger flowers with very short broad tube and broad rounded lobes. The blackish colour of the leaves when dried is very peculiar.

37. **V. buxifolia**, *Benth. in D.C. Prodr.* x. 462.—A stout erect much or sparingly branched perfectly glabrous shrub 1–5 ft. high; branches strict, densely leafy, below closely ringed with the scars of the fallen leaves. Leaves closely imbricate, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, broadly oblong-obovate, obtuse or subacute, suddenly truncate or cordate above the very short thick petiole, concave, keeled by the prominent midrib, rigid, very coriaceous, dark-green and polished above, paler and usually minutely dotted beneath, quite glabrous, entire. Spikes in the axils of the upper leaves, $\frac{1}{4}$ –1 in. long, dense-flowered, often very numerous and crowded, forming a corymbose head to the branches; rhachis puberulous; bracts large, ovate, concave, coriaceous, equalling the calyx or sometimes exceeding it. Flowers sessile, white, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Calyx 4-partite; segments coriaceous, oblong, obtuse, ciliolate. Corolla-tube equalling the calyx or rather longer than it; limb 4-lobed; dorsal and lateral lobes broad, rounded; anticus narrower and subacute. Capsule broadly oblong, obtuse, compressed, almost twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i. 194; *Handb. N.Z. Fl.* 210; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 523.

Var. **patens**, *Cheesem.* — Leaves spreading. Spikes more numerous. Flowers rather larger.—*V. buxifolia* var. *odora*, *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 524 (*but not V. odora*, *Hook. f.*)

NORTH ISLAND: High mountains of the interior, from Hikurangi, Tongariro, and Mount Egmont southwards to the Tararua Range. SOUTH ISLAND: Abundant in mountain districts throughout. Var. *patens*: Plentiful from Nelson to Foveaux Strait. STEWART ISLAND: Not uncommon. Usually from 2000 ft. to 4000 ft., but descends to sea-level in Stewart Island. December–March.

An abundant plant in mountain districts, recognised without any difficulty by the stout erect rigid habit, dark-green closely imbricated keeled leaves, which are conspicuously truncate or subcordate at the base, and by the usually numerous short spikes massed into a compact terminal inflorescence. Mr. Kirk considered my var. *patens* to be identical with *V. odora*, *Hook. f.*, which Hooker had reduced to *V. buxifolia* in the Handbook; but Mr. N. E. Brown, who has kindly examined the types of *V. odora* for me, states that this view is altogether incorrect. I refer *V. odora* to *V. elliptica*.

38. **V. anomala**, *Armstr. in Trans. N.Z. Inst.* iv. (1872) 291. —An erect perfectly glabrous much-branched shrub 3–5 ft. high; branches long, slender, fastigiate, leafy, purplish towards the tips. Leaves spreading, sessile or nearly so, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad, linear-oblong or elliptic-lanceolate, subacute, keeled, coriaceous, dark-green and shining above, paler beneath, midrib obscure. Spikes crowded together at the tips of the branches, 5–10-flowered, forming a short terminal panicle; rhachis puberulous; bracts ovate, acute, coriaceous, as long as the calyx. Flowers sessile, white or pale-pink, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Calyx 3-partite with one of the segments broader and emarginate or 2-lobed, more rarely 4-partite; segments linear-oblong, obtuse. Corolla-tube slender, tubular, about twice as long as the calyx; limb either 3-lobed with the anticus lobe entirely suppressed, or 4-lobed with the anticus lobe small and narrow-linear; the dorsal and lateral lobes oblong, obtuse. Capsule ovate-oblong, obtuse, glabrous, half as long again as the calyx.—*Trans. N.Z. Inst.* xiii. (1881) 355; *Hook. f. Bot. Mag.* t. 7360.

SOUTH ISLAND: Canterbury—Rakaia Valley, Mount Peel, Mount Cook, *Armstrong!* 3000–4000 ft. December–February.

A very handsome and attractive species. Its nearest ally is *V. buxifolia* var. *patens*, narrow-leaved states of which approach it very closely. Sir J. D. Hooker remarks that in England he has never seen cultivated specimens with the anticus lobe of the corolla entirely suppressed, although it is always much smaller and narrower than the other three. In New Zealand cultivated specimens are variable in this respect. Usually some of the flowers want the anticus lobe and others possess it, but it is easy to find plants in which it is either always absent or always present. The few wild specimens that I have seen have no trace of the anticus lobe; but I suspect that a larger series would show that it is frequently developed.

39. **V. decumbens**, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 352.—A small decumbent much-branched shrub 1–3 ft. high; branches spreading, purplish-black, bifariously pubescent. Leaves

close-set or rather distant, spreading, shortly petiolate, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, oblong-obovate or elliptic-oblong or narrow oblong-ovate, subacute or obtuse, coriaceous when dry, almost fleshy when fresh, quite glabrous, flat or slightly concave, dark-green with bright-red margins. Racemes 2–4 near the tips of the branches, equalling the leaves or slightly longer than them, shortly peduncled, dense-flowered; rhachis pubescent; pedicels very short, sometimes almost wanting; bracts small, much shorter than the calyx. Flowers white, $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate, acute, margins minutely ciliolate. Corolla-tube twice as long as the calyx or rather longer; limb 4-lobed; lobes broadly oblong, obtuse, the anterior one narrower. Capsule ovate, acute, compressed, glabrous, twice as long as the calyx.

SOUTH ISLAND: Mountains of Nelson, Marlborough, and North Canterbury, not uncommon. 1500–4500 ft. December–February.

A very beautiful little plant, well marked off from all its allies by the polished purplish-black branchlets, almost flat green leaves with red margins, shortly pedicellate flowers, small bracts, long corolla-tube, and short limb. Mr. Armstrong's description is by no means good; but there is no question as to the identity of the plant.

40. **V. Gibbsii**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 524.—A sparingly branched shrub 9–18 in. high; branches as stout as a goose-quill, ringed with the scars of the fallen leaves. Leaves decussate, close-set, imbricating, erect or spreading, sessile, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, ovate or ovate-oblong, acute or obtuse, coriaceous, glaucous, often tinged with purplish-red, glabrous except the margins, which are fringed with long soft white hairs. Spikes 2–4 near the tips of the branches, peduncled, longer than the leaves, dense-flowered; rhachis and bracts villous with soft white hairs; bracts lanceolate, acute, exceeding the calyx. Flowers $\frac{1}{5}$ in. diam., white, sessile or the lower ones very shortly pedicelled. Calyx 4-partite; segments lanceolate or ovate-lanceolate, acute, margins villous. Corolla-tube narrow, about twice as long as the calyx; limb 4-lobed; lobes ovate, acute. Style glabrous or sparingly villous near the base. Capsule narrow-ovate, acute, compressed, about twice as long as the calyx.

SOUTH ISLAND: Nelson — Mount Rintoul and Ben Nevis, alt. 3000–4000 ft., *F. G. Gibbs*!

A distinct species, nearest to *V. carnosula*, but at once separated by the less concave and more acute leaves with conspicuously villous margins, acuminate bracts, and narrow acute calyx-segments.

41. **V. carnosula**, *Hook. f. Handb. N.Z. Fl.* 210.—A much-branched erect or decumbent woody shrub 6 in. to 3 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves, the younger ones pubescent towards the tips. Leaves closely imbricating, spreading or erect, sessile, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{4}$ – $\frac{2}{3}$ in. broad, broadly

obovate or almost orbicular, obtuse, very coriaceous, concave, not keeled, quite glabrous, nerveless or the midrib very obscure, glaucous; margins smooth and even. Spikes crowded near the ends of the branches, often forming a dense terminal head, short, stout, very dense-flowered; peduncle, rhachis, and bracts pubescent or almost villous; bracts equalling the calyx, ciliolate. Flowers about $\frac{1}{4}$ in. diam., sessile, white. Calyx 4-partite; segments erect, ovate-oblong, obtuse, slightly ciliate. Corolla-tube equalling the calyx or rather shorter than it; limb 4-lobed. Ovary and style glabrous. Capsule $\frac{1}{8}$ – $\frac{1}{5}$ in. long, ovate, acute, glabrous, compressed, about twice as long as the calyx.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350. *V. lævis* var. *carosula*, *Hook. f. Fl. Nov. Zel.* i. 194.

SOUTH ISLAND: Mountain districts from Nelson to Otago, but apparently not so abundant as *V. pinguifolia*. 2500–4500 ft. December–March.

Very closely allied to *V. pinguifolia*, differing mainly in the rather larger ovate-acute glabrous capsule. The capsule of *V. pinguifolia* is obovate-oblong, rounded or emarginate at the tip, and more or less pubescent.

42. ***V. amplexicaulis***, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 352.—An erect or decumbent shrub 1–3 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves; branchlets terete, glabrous or puberulous. Leaves decussate, imbricate, sub-erect or spreading, sessile, $\frac{1}{2}$ –1 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, broadly oblong or elliptic-oblong, rounded at the tip, subcordate and almost amplexicaul at the base, very coriaceous, glaucous, concave, nerveless, not keeled; margins smooth and even. Spikes 2–4 near the tips of the branches, 1–1½ in. long, stout, oblong, very dense-flowered, simple or trifurcate; peduncles stout, exceeding the leaves, and with the rhachis pubescent with soft spreading hairs; bracts large, equalling the calyx, broadly oblong, concave, obtuse, margins ciliate. Flowers white, $\frac{1}{4}$ in. diam., sessile. Calyx 4-partite; segments erect, oblong, obtuse, ciliate. Corolla-tube about the length of the calyx; limb 4-lobed; dorsal lobe the broadest, erect; the other three narrow-oblong, obtuse, spreading or decurved. Ovary pubescent. Capsule oblong, rounded at the tip, pubescent, about half as long again as the calyx.—*Hook. f. Bot. Mag.* t. 7370.

SOUTH ISLAND: Canterbury—Upper Rangitata, *Armstrong!*

Closely related to *V. pinguifolia*, from which it differs in the larger leaves, which are cordate and semiamplexicaul at the base, and in the larger and often branched spikes. Mr. Armstrong describes the corolla-tube as “long,” but it barely equals the calyx in all the specimens I have seen, including an authentic one from him.

43. ***V. pinguifolia***, *Hook. f. Handb. N.Z. Fl.* 210.—An erect or decumbent much-branched glaucous shrub 6 in. to 4 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves, the younger ones bifariously pubescent. Leaves closely

imbricating, spreading or erecto-patent, sessile, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{2}$ in. broad, broad or narrow obovate-oblong to broadly oblong or sub-orbicular, obtuse, narrowed to a broad base, concave above, rounded at the back, very coriaceous or almost fleshy, quite glabrous, nerveless, glaucous, margins often edged with red. Spikes crowded near the tips of the branches, short, stout, dense-flowered, exceeding the leaves; peduncle and rhachis pubescent; bracts oblong, concave, as long as the calyx. Flowers white, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., sessile. Calyx 4-partite; segments erect, oblong, obtuse, puberulous, margins ciliate. Corolla-tube short, not exceeding the calyx; limb 4-lobed; lobes ovate-oblong or broadly oblong, obtuse, the anterior one narrower than the others. Ovary pubescent; style usually villous towards the base. Capsule oblong or obovate, obtuse, rounded at the tip, pubescent, from half as long again to nearly twice as long as the calyx.—*Bot. Mag.* t. 6147; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350. *V. carnosula*, *Hook. f. in Bot. Mag.* t. 6587 (not of *Handb. N.Z. Fl.* 210).

SOUTH ISLAND: Mountains of Nelson, Marlborough, Canterbury, and Otago, abundant. 2500–4500 ft. December–February.

A very variable plant, especially in size and mode of growth, and in the size, shape, and colour of the leaves. Its nearest allies are *V. carnosula* and *V. amplexicaulis*, the first of which differs in the glabrous ovary and acute capsule, the latter in the larger leaves subcordate at the base, and larger often branched spikes. Small states, with smaller and narrower and more rigid leaves, approach var. *major* of *V. Buchanani*. From the other species of the section it is at once removed by the deeply concave obtuse leaves rounded (not keeled) at the back.

44. **V. Buchanani**, *Hook. f. Handb. N.Z. Fl.* 211.—A small woody shrub 4–12 in. high, much branched from the base; branches stout, terete, spreading or decumbent, sometimes tortuous, closely ringed with the scars of the fallen leaves; bark black; branchlets usually pubescent at the tips. Leaves decussate, closely imbricate, sessile by a broad base, suberect or spreading, rarely deflexed, $\frac{1}{8}$ – $\frac{1}{4}$ in. long and almost as broad, broadly oblong or almost orbicular, obtuse or more rarely subacute, very thick and coriaceous, concave, rarely obscurely keeled, nerveless, quite glabrous. Spikes 2–4 near the tips of the branches, short and stout but much longer than the leaves, oblong, dense-flowered, shortly peduncled; peduncle and rhachis villous-pubescent; bracts large, concave, ciliate, equalling the calyx or exceeding it. Flowers $\frac{1}{2}$ in. diam., white, sessile. Calyx 4-partite; segments erect, oblong, obtuse, ciliate. Corolla-tube short, included in the calyx or barely equaling it; limb 4-lobed; lobes broadly oblong, obtuse. Ovary and style pubescent. Capsule nearly twice as long as the calyx, oblong or oblong-obovate, obtuse, pubescent.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350; *Kirk, l.c.* xxviii. (1896) 523.

Var. **maior**, *Cheesem.*—Taller and stouter. Leaves larger, spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, obovate or obovate-oblong, narrowed to the base, midrib often distinct beneath. Spikes larger, 1 in. long; peduncle and rhachis densely villous. Style conspicuously villous.

Var. **exigua**, *Cheesem.*—Branches numerous, twiggy. Leaves narrower, $\frac{1}{8}$ – $\frac{1}{4}$ in., oblong-ovate, subacute, obscurely keeled. Spikes small, $\frac{1}{3}$ in. long, few-flowered.

SOUTH ISLAND: Canterbury—Mount Cook district (var. *maior* and *exigua*), T. F. C. Otago—Mount Alta, *Buchanan!* Mount Arnould, *Petrie!* Mount Kye-burn (var. *maior*), *Petrie!* H. J. Matthews! 3000–6000 ft. December–February.

Also a very variable plant. The extreme state, represented by Buchanan's Mount Alta specimens, is easily recognised by the small uniform close-set almost orbicular spreading leaves and capitate spikes; but larger forms approach *V. pinguifolia* so closely that it is difficult to draw a line of demarcation between the two species. My var. *maior* might be referred to either.

45. **V. pimeleoides**, *Hook. f. Fl. Nov. Zel.* i. 195.—A small much-branched prostrate or suberect shrubby plant 3–18 in. high; branches rather slender, straggling, pubescent or almost villous, rarely glabrous. Leaves usually rather laxly placed, rarely close-set, spreading or suberect, sessile, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, obovate-oblong or ovate-oblong to elliptic-lanceolate, obtuse or subacute, coriaceous, glaucous, obtusely keeled. Spikes near the tips of the branches, peduncled, exceeding the leaves, $\frac{1}{2}$ –1 in. long; rhachis villous-pubescent; bracts large, almost or quite equalling the calyx, ciliate. Flowers $\frac{1}{4}$ in. diam., dark purplish-blue, sessile. Calyx 4-partite; segments ovate, acute, ciliate. Corolla-tube very short, not equalling the calyx; limb broad, spreading, 4-lobed; lobes broad, obtuse, the anterior one narrower than the others. Capsule $\frac{1}{6}$ in. long, ovate, acute, turgid, glabrous or slightly pubescent, twice as long as the calyx.—*Handb. N.Z. Fl.* 211; *Armstr. in Trans. N.Z. Inst.* xiii. (1891) 350.

Var. **glauco-cærulea**, *Cheesem.*—Larger and stouter, more intensely glaucous. Leaves $\frac{1}{2}$ – $\frac{1}{2}$ in. long, obovate or obovate-oblong, shortly petiolate. Flowers dark-blue or purple. *V. glauco-cærulea*, *Armstr. l.c.* 353.

Var. **minor**, *Hook. f. Handb. N.Z. Fl.* 738.—Smaller, 1–4 in. high, sparingly branched. Leaves smaller and narrower, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, lanceolate to oblong-ovate, usually acute. Spikes small, few-flowered.

SOUTH ISLAND: Mountains of Nelson, Canterbury, and Otago, not uncommon in dry places. 1000–3500 ft. November–January.

Well marked by the small size, prostrate or straggling habit, small glaucous leaves, villous spikes, and purplish-blue flowers.

46. **V. Gilliesiana**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 519.—Stems prostrate or decumbent, much branched, 3–12 in. long; branches spreading or suberect, densely leafy, tetragonous, with the leaves on $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., bright-green when fresh, black when dry. Leaves densely imbricating, opposite pairs connate by

the dilated bases, spreading above, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, linear or linear-oblong, obtuse and tumid at the tip, deeply concave in front, convex on the back, rather fleshy; margins ciliate-denticulate along their whole length. Leaves of young plants linear, irregularly lobulate or pinnatifid, glabrous. Flowers small, white, $\frac{1}{8}$ – $\frac{1}{4}$ in. diam., usually arranged in axillary 2–4-flowered spikes near the tips of the branches, the spikes often forming a subcapitate head, more rarely the flowers are solitary and axillary. Calyx deeply 4-partite; segments linear-oblong, obtuse, margins ciliate. Corolla-tube short; lobes 4, spreading, orbicular-oblong, obtuse, almost equal, but the dorsal one slightly broader and the anticus one slightly narrower than the others. Stamens 2 or very rarely 4; filaments very short, altogether included. Style included. Capsule exceeding the calyx, ovoid-oblong, subcompressed, seated within a cupular disc.—*Logania ciliolata*, *Hook. f. Handb. N.Z. Fl.* 737. *Mitrasacme Hookeri*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 348, t. 29, f. 1.

SOUTH ISLAND: Nelson—Mount Arthur and Mount Owen, *T. F. C.*; Mount Mantell, Mount Buckland, *W. Townson*! Mount Franklin, *F. G. Gibbs*! Mount Percival, *T. F. C.*; Amuri, *Kirk*! Canterbury—Arthur's Pass and Waimakariri Glacier, *Kirk*! *T. F. C.*, *Cockayne*! Browning's Pass and Rangitata Valley, *Haast*! Mount Cook district, *T. F. C.* Westland—Kelly's Hill, *Petrie*! Mount Alexander, *Cockayne*! Otago—Mount Alta, *Buchanan*! 3000–5500 ft. December–March.

A very remarkable and distinct species, quite unlike any other.

47. **V. tetrasticha**, *Hook. f. Handb. N.Z. Fl.* 212.—A small much-branched shrub forming depressed patches 4–12 in. diam.; branches very numerous, decumbent below, erect or spreading above; branchlets acutely tetragonous with the faces more or less concave, with the leaves on $\frac{1}{12}$ – $\frac{1}{10}$ in. diam., black when dry. Leaves most densely quadrifariously imbricated, opposite pairs connate at the base and forming a short ring clasping the branch, spreading above, $\frac{1}{14}$ – $\frac{1}{10}$ in. long, ovate-deltoid, narrowed into a short subacute tip, thick and coriaceous, concave in front, rounded or flat on the back, not keeled; margins ciliate. Leaves of young plants linear-spathulate, flat, spreading, ciliate and sparsely hispid. Flowers in short 2–4-flowered spikes near the ends of the branchlets, small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., white; rhachis and peduncle villous. Calyx deeply 4-partite; segments linear-oblong, obtuse. Corolla-tube short; limb with four equal spreading rounded lobes. Stamens 2, at first included, but the filaments lengthen before the flower withers. Ovary seated in a cupular disc. Capsule twice as long as the calyx, obovoid, compressed, obtuse.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *Kirk, l.c.* xxviii. (1896) 521; *Cockayne, l.c.* xxxi. (1899) 377 (*development of seedling*).

SOUTH ISLAND: Nelson—Wairau Mountains, *Travers, T. F. C.*; Mount Captain, *Kirk*! Canterbury—Mount Torlesse, *Cockayne*! Black Range, *Enys*! *Kirk*! *T. F. C.*, *Petrie*! *Cockayne*! Hopkins River, *Haast*. 3000–6000 ft. December–March.

A well-marked plant, the only near ally of which is the following species, which may prove to be a form of it.

48. **V. quadrifaria**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 521.—Habit, size, and general appearance of *V. tetrasticha*, but the branchlets are more slender and wiry, about $\frac{1}{15}$ in. diam. with the leaves on, tetragonous with the faces flat, not concave. Leaves most densely quadrifariously imbricated, opposite pairs very shortly connate at the base and forming a ring clasping the branch, closely appressed, $\frac{1}{18}$ – $\frac{1}{16}$ in. long, broadly triangular, acute or subacute, coriaceous, concave in front, rounded on the back, not keeled; margins ciliolate towards the base or throughout their whole length. Flowers small, white, $\frac{1}{16}$ in. diam., arranged in very short axillary 2–4-flowered spikes, the spikes usually capitate at the tip of the branchlets. Calyx 4-partite almost to the base; segments linear-oblong, obtuse, ciliolate. Corolla-tube short, equalling the calyx; lobes 4, rounded, spreading. Stamens 2; filaments short. Ovary seated in a cupular disc. Capsule twice as long as the calyx, oblong-obovoid, compressed, obtuse. — *Mitrasacme Cheesemanii*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 348, t. 29, f. 2.

SOUTH ISLAND: Nelson—Mount Percival, *T. F. C.*; Mount Charon, *Cockayne*! Canterbury—Mount Dobson, *T. F. C.* Otago—Mount Alta, *Buchanan*! 3500–6000 ft. December–March.

Very near to the preceding, from which it differs in the more slender branchlets, which are tetragonous with almost flat sides, not concave; and in the smaller leaves, which are more closely appressed, and are broadly triangular with straight edges. In *V. tetrasticha* the leaves are rather suddenly narrowed above the broad base, so that the margin is curved, not straight. The flowers and capsules are also smaller than in *V. tetrasticha*.

49. **V. tumida**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 521.—A prostrate or decumbent much-branched plant forming broad depressed patches 6–18 in. diam.; branches very numerous, obtusely tetragonous, with the leaves on $\frac{1}{12}$ – $\frac{1}{16}$ in. diam., black when dry. Leaves densely imbricated, opposite pairs connate at the base, $\frac{1}{15}$ – $\frac{1}{12}$ in. long, broadly ovate-deltoid, tumid, obtuse, concave in front, rounded or obtusely keeled at the back, margins ciliolate. Flowers in 2–4 flowered abbreviated spikes at the ends of the branchlets, small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., white. Calyx deeply 4-partite; segments linear-oblong, obtuse, ciliolate. Corolla-tube short; limb with 4 nearly equal spreading oblong obtuse lobes. Stamens 2, included; anthers almost as long as the filaments. Ovary seated in a cupular disc. Capsule exceeding the calyx, subcompressed, broadly oblong, obtuse.

SOUTH ISLAND: Nelson—Gordon's Nob and St. Arnaud Mountains, *Monro*, *T. F. C.*; Mount Rintoul and Ben Nevis, *F. G. Gibbs*! Mount Starveall, *W. H. Bryant*! Mount Richmond, *J. H. Macmahon*! Otago—*Herb. Buchanan*! (exact locality not stated). 3000–5000 ft. December–February.

Nearest to *V. tetrasticha*, from which it is separated without any difficulty by the obtusely tetragonous branchlets, tumid obtuse leaves, and broader shorter capsule. Mr. N. E. Brown informs me that the specimens quoted in the Handbook under *V. tetragona* from Gordon's Nob (Monro) and Waiau-au Valley (Travers) in reality belong to this species.

50. *V. tetragona*, Hook. *Ic. Plant.* t. 580.—A small usually erect much-branched shrub 6 in. to 3 ft. high; stems ringed with the scars of the fallen leaves; branches stout, rigid, erect, obtusely 4-angled when adult, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam. Leaves most densely quadrifariouly imbricated, erect, opposite pairs connate at the base, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, broadly deltoid-ovate, obtuse, keeled at the back, very thick and coriaceous, smooth and shining, margins and base usually ciliolate or woolly. Flowers 3–8, sessile among the uppermost leaves and forming small terminal heads, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., white. Bracts conspicuously furrowed, woolly at the base. Calyx-segments unequal, linear-oblong, obtuse, furrowed. Corolla 4-lobed; lobes spreading, dorsal the largest, obovate, entire or emarginate, anticus the smallest, narrow-oblong. Capsule broadly oblong, subacute, compressed, exceeding the calyx.—*Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 194; *Handb. N.Z. Fl.* 211; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351. *V. subsimilis*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 278.

NORTH ISLAND: Mountain districts from Mount Hikurangi and Tongariro southwards to the Tararua Range, abundant. 2000–5500 ft. December–February.

A very remarkable species. Flowerless specimens so closely resemble a *Podocarpus* or *Dacrydium* that Sir W. J. Hooker had a plate prepared for the "Icones Plantarum" under the name of *Podocarpus Dieffenbachii*. I have seen no specimens from the South Island, and it is now quite certain that most (if not all) of the South Island localities assigned to the species in the Handbook belong to other species.

51. *V. lycopodioides*, Hook. *f. Handb. N.Z. Fl.* 211.—A stout much-branched shrub 1–4 ft. high; branches rigid, erect, clothed with densely imbricating leaves, acutely or obtusely 4-angled when adult, $\frac{1}{10}$ – $\frac{1}{8}$ in. diam. Leaves dimorphic, the adult state most densely quadrifariouly imbricated, the opposite pairs connate at the base, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, very broadly ovate-deltoid, concave in front, keeled on the back, suddenly narrowed into a stout obtuse cusp or point, very coriaceous, smooth or more or less distinctly grooved on the back, margins glabrous or ciliolate. Leaves of young plants (frequently found by reversion on older ones as well) twice as long as the mature ones, spreading, linear-subulate with a broad base, entire or more frequently irregularly lobed or almost pectinate-pinnatifid. Flowers crowded at the tips of the branches, forming small terminal heads, $\frac{1}{3}$ in. diam., white. Bracts furrowed, ciliolate. Calyx-segments unequal, oblong. Corolla-tube about equal to the calyx; lobes 4, spreading, the

dorsal one the largest. Capsule broadly oblong, subcompressed, exceeding the calyx.—*Bot. Mag.* t. 7338; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351.

SOUTH ISLAND: Not uncommon in subalpine localities throughout. 2500–5500 ft. December–February.

Very closely allied to *V. tetragona*, from which it can only be distinguished by the more acutely 4-angled branches and rather broader leaves, which are suddenly narrowed into a bluntish cusp or point.

52. *V. Hectori*, *Hook. f. Handb. N.Z. Fl.* 212.—A small robust much-branched shrub 6–30 in. high; stem woody, terete, closely ringed by the scars of the fallen leaves; branches terete or very obscurely tetragonous, stout, rigid, erect, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., blackish-brown when dry. Leaves densely imbricated, opposite pairs connate to the middle or higher and forming a closely appressed ring surrounding the branch (sometimes slightly open at the mouth), $\frac{1}{10}$ – $\frac{1}{8}$ in. long, broader than long, broadly orbicular-oblong, obtuse, concave in front, rounded and polished at the back, not keeled, extremely thick and coriaceous, margins of the younger leaves often ciliate. Leaves of young plants not seen. Flowers axillary, crowded at the tips of the branchlets, forming small terminal heads, about $\frac{1}{4}$ in. diam., white. Calyx-segments linear-oblong, obtuse, ciliate. Corolla-tube about as long as the calyx; lobes oblong, obtuse, dorsal one the largest. Capsule exceeding the calyx, broadly oblong, subcompressed, obtuse.—*Bot. Mag.* t. 7415; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 352.

SOUTH ISLAND: Canterbury—Southern Alps, *Haast, Armstrong*; Mount Cook district, *T. F. C.* Otago—Mount Alta, *Hector* and *Buchanan*! Mount Tyndall and the Hector Mountains, *Petrie*! Humboldt Mountains, *Cockayne*! Mount Earnslaw, *H. J. Matthews*! 3500–6000 ft. January–March.

Most nearly allied to *V. lycopodioides*, but recognised without any difficulty by the terete branchlets, and by the leaves being connate to above the middle, and obtuse, not pointed. The much stouter branchlets at once separate it from *V. salicornioides* and *V. Armstrongii*.

53. *V. coarctata*, *Cheesem. n. sp.*—A small stout much-branched shrub 1–3 ft. high; branches close, spreading; branchlets numerous, rather stout, $\frac{1}{12}$ – $\frac{1}{10}$ in. diam, terete or obscurely tetragonous, densely clothed with appressed imbricating leaves, blackish when dry. Leaves of mature plants densely imbricating, about $\frac{1}{10}$ in. long, the opposite pairs connate to above the middle into a ring or sheath closely appressed to the branch, obtuse or subacute, thick and coriaceous, smooth and polished on the back; margins usually ciliate. Leaves of young plants not seen. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., white, from 4 to 8 near the tips of the branchlets, forming small terminal heads; bracts broad, ciliate. Calyx short; segments oblong, obtuse, ciliate. Corolla-tube included in the calyx; lobes spreading, the dorsal one the largest. Capsule about $\frac{1}{8}$ in. long, nearly twice as long as the calyx, ovoid, obtuse.

SOUTH ISLAND: Nelson—Mount Arthur and Mount Owen, *T. F. C.*; Mount Owen and Brunner Range, *Townson!* 3500–5000 ft. January–March.

I describe this as a new species with some hesitation. It appears to be intermediate in characters between *V. Hectori* and *V. Armstrongii*, but is much more slender and more copiously branched than the first, and from the latter it differs in being stouter, and in the shorter and broader tightly appressed leaves, which do not form the lax obconic sheaths so characteristic of *V. Armstrongii*.

54. *V. salicornioides*, *Hook. f. Handb. N.Z. Fl.* 212.—A small much-branched shrub 1–3 ft. high; branches strict, erect, terete, clothed with imbricating leaves, $\frac{1}{14}$ – $\frac{1}{12}$ in. diam., yellowish-brown when dry. Leaves most densely imbricated and appressed to the branch, opposite pairs connate to considerably above the middle and forming a ring surrounding the branch, $\frac{1}{15}$ – $\frac{1}{16}$ in. long, subacute or almost truncate, concave in front, rounded at the back; margins usually ciliate. Leaves of young plants not seen. Flowers 4–8 towards the tips of the branchlets, forming small terminal heads; rhachis villous. Bracts short and broad, ciliate. Calyx-segments oblong, obtuse, margins ciliate. Corolla white, $\frac{1}{4}$ in. diam.; tube short; limb 4-lobed, lobes spreading. Capsule longer than the calyx, subcompressed, oblong, obtuse, glabrous.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 352; *N. E. Brown in Gard. Chron.* (1888) vol. i. p. 20, f. 3.

SOUTH ISLAND: Nelson—Cobb Valley, *F. G. Gibbs!* Wairau Mountains, *Rough, Travers;* Wairau Gorge, *T. F. C.*; Mount Charon (Hammer), *Cockayne!* Canterbury—Rangitata Valley, *Haast, Armstrong.* 2500–5000 ft. January–March.

This has been much misunderstood, the name having been erroneously applied, both in England and in the colony, to the plant described herein as *V. propinqua*, from which it differs in the more erect habit, in the stouter strict branches, and in the more closely placed broader and shorter leaves.

55. *V. Armstrongii*, *T. Kirk in Trans. N.Z. Inst.* xi. (1879) 464.—A small much-branched shrub 1–3 ft. high; branches spreading, often flabellate; branchlets very numerous, slender, terete, clothed with appressed imbricating leaves, $\frac{1}{16}$ – $\frac{1}{12}$ in. diam. Leaves of mature plants closely imbricating, appressed but not very closely so, about $\frac{1}{10}$ in. long, opposite pairs connate for the greater part of their length, forming a sheath investing the branch which is wider at the top than the base, and thus almost obconic in shape, truncate or nearly so at the apex, tumid and coriaceous, smooth and rounded on the back, margins usually ciliate. Leaves of young plants (frequently produced by reversion on old ones as well) spreading, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, linear, acute, flat, entire or irregularly lobulate. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., white, 4–8 or more towards the tips of the branchlets, forming small terminal heads; rhachis villous. Calyx-segments unequal, oblong, obtuse, ciliate. Corolla-tube short, about equalling the calyx; lobes spreading. Capsule $\frac{1}{8}$ in. long,

about twice as long as the calyx, oblong-ovoid, compressed, obtuse or slightly retuse.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 352; *Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 396, t. 28, 29.

SOUTH ISLAND: Mountain districts from Nelson to Otago, but not common. 2000–5000 ft. December–February.

Closely allied to *V. Hectori* and *V. salicornioides*, from both of which it differs in the more spreading and much more copiously branched habit, and especially in the leaves, which are connate into an almost obconic sheath which is free from the branch at the tip, and truncate, or nearly so.

56. *V. propinqua*, *Cheesem. n. sp.*—A small much-branched shrub 1–3 ft. high; branches spreading, sometimes decumbent or tortuous; branchlets numerous, slender, about $\frac{1}{10}$ in. diam. Leaves of mature plants densely imbricated, the opposite pairs connate for the greater part of their length, each pair forming a closed sheath round the branch $\frac{1}{10}$ – $\frac{1}{8}$ in. long, the lower part of which is adnate to the branch, the upper part free and somewhat expanded, the free tips of the leaves very short, obtusely triangular, thick and coriaceous; margins ciliolate. Leaves of young plants free, linear or spatulate, entire or irregularly lobulate-pinnatifid. Flowers $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., white, 4–8 near the tips of the branchlets, forming small terminal heads; rhachis villous. Calyx small; segments linear-oblong, obtuse, ciliolate. Corolla-tube about equalling the calyx; lobes spreading, unequal, the dorsal the largest. Capsule nearly twice as long as the calyx, about $\frac{1}{8}$ in. long, ovoid, compressed, obtuse.—*V. salicornioides*, *Hort. (not of Hook. f.)*. *V. cupressoides* var. *variabilis*, *N. E. Brown in Gard. Chron.* (1888) vol. i. 20, f. 5 (*exclude F*).

SOUTH ISLAND: Otago—Upper Waipori and Maungatua, *Petrie*! Mount Ida and Mount Bonpland, *H. J. Matthews*! 2500–5000 ft. December–February.

This has been cultivated in gardens for many years under the name of *V. salicornioides*, from which, however, it is altogether distinct, as was first pointed out by Mr. N. E. Brown in the *Gardeners' Chronicle*. It was referred by Mr. Brown to *V. cupressoides*, but it differs from that plant in size, mode of growth, leaves, and in the flowers and capsule, and Mr. Brown now agrees with me in considering it to be a distinct species. Its nearest affinity is with *V. Armstrongii*, but the branches are much more slender, and the leaves smaller and narrower.

57. *V. cupressoides*, *Hook. f. Handb. N.Z. Fl.* 212.—A much and closely branched round-topped shrub 3–6 ft. high; branches divaricating; branchlets numerous, green, very slender, $\frac{1}{30}$ in. diam. or less, terete, very minutely puberulous or glabrous, clothed with decussate scale-like leaves resembling those of a cypress. Leaves of mature plants in rather remote pairs, considerably shorter than the internodes, $\frac{1}{20}$ – $\frac{1}{15}$ in. long, not broader than the branch, ovate-oblong, obtuse, opposite pairs connate at the base, appressed or patent, rather fleshy, glabrous or minutely ciliolate. Leaves of young plants (often produced by reversion on the branches of old

ones) $\frac{1}{10}$ – $\frac{1}{4}$ in. long, linear-oblong to oblong or oblong-spathulate, acute, narrowed into short free petioles, entire or irregularly lobulate or pinnatifid. Flowers small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., pale bluish-purple or rarely white, sessile or nearly so, 3–8 near the tips of the branchlets, forming small terminal heads. Calyx unequally 4-lobed; lobes short, oblong, obtuse. Corolla-tube very short; lobes spreading, dorsal the largest, oblong-obovate, anticus the smallest, linear-oblong. Capsule small, $\frac{1}{12}$ in. long, about twice as long as the calyx, linear-obovoid or narrow cuneate-obovoid, retuse at the tip.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 351; *N. E. Brown in Gard. Chron.* (1888) vol. i. 20, t. 4 and 6; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 520.

SOUTH ISLAND: Nelson—Upper Wairau Valley, *Sinclair, T. F. C.*; Lake Tennyson, *T. F. C.*; Fowler's Pass and Stanley River, *Kirk!* Waiau Valley, *Travers!* Canterbury—Broken River basin, *Enys!* *Kirk!* *T. F. C.*; Harper's Pass and Ashburton Valley, *Haast!* Otago—Lindis Pass and Lake district, *Hector and Buchanan!* Lammerlaw Hills, *Petrie!* 2000–4500 ft. December–February.

A very remarkable species, easily distinguished by its cypress-like appearance, very slender branchlets, small scale-like leaves in remote pairs, and small narrow obovoid capsules.

58. **V. Haastii**, *Hook. f. Handb. N.Z. Fl.* 213.—A prostrate or decumbent much or sparingly branched glabrous shrub, black when dry; stems woody, tortuous, 4–12 in. long; branches ascending, densely uniformly leafy, obscurely tetraginous, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam. with the leaves on. Leaves closely quadrifurcately imbricated, opposite pars connate at the very base, spreading or suberect, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, broadly oblong to obovate, obtuse, concave in front, not keeled at the back, fleshy when fresh, extremely coriaceous and rigid when dry; margins ciliate at the very base. Flowers small, white, most densely compacted in terminal ovoid heads $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, formed of numerous reduced spikes in the axils of leafy bracts. Bracts oblong or ovate-oblong, about equalling the calyx. Calyx 4-partite; segments linear-oblong, obtuse. Corolla-tube longer than the limb, rather shorter than the calyx; limb exserted, $\frac{1}{6}$ in. diam., 4-lobed; lobes ovate, subacute. Capsule about equalling the calyx, ovoid-oblong, acute.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350.

Var. **macrocalyx**.—Much more copiously branched, prostrate and trailing, brown when dry. Leaves $\frac{1}{3}$ – $\frac{2}{3}$ in. long, obovate or broadly obovate-spathulate, obtuse, bright-green and fleshy when fresh. Bracts lanceolate or linear, acute. Calyx-segments linear, obtuse or subacute, almost equalling the corolla. Corolla-tube longer than the narrow limb.—*V. macrocalyx, Armstr. in Trans. N.Z. Inst.* xiii. (1881) 353.

SOUTH ISLAND: Nelson—Mount Arthur, *T. F. C.* Canterbury—Mount Torlesse and Mount Dobson, *Haast, T. F. C.*; mountains above the Broken River, *Enys!* *T. F. C.*; Mount Darwin and Mount Cook, *Haast.* Var. **macrocalyx**: Mount Rolleston and Waimakariri Glacier, *Armstrong!* *T. F. C.*, *Cockayne!* Rangitata Valley, *Armstrong.* 3500–6500 ft. December–February.

A well-marked species. The var. *macrocalyx* principally differs in its more branched and trailing habit, longer and narrower leaves, which are not so coriaceous when dry, longer and narrower bracts and calyx-segments, and shorter narrower corolla. Mr. N. E. Brown is inclined to treat it as a distinct species, but it appears to me to be connected with the type by intermediate forms.

59. *V. epacridea*, Hook. f. *Handb. N.Z. Fl.* 213.—A small much-branched prostrate or decumbent rigid shrub; stems woody, tortuous, 3–12 in. long; branches curved, ascending at the tips, densely leafy, obscurely tetragonous, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. with the leaves on, glabrous or pubescent above. Leaves closely quadrifariouly imbricated, opposite pairs connate at the base, spreading and recurved, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, broadly oblong or obovate-oblong, obtuse or subacute, concave in front, keeled at the back, rigid, very coriaceous; margins usually red, thickened, ciliate towards the base. Flowers small, white, densely packed in terminal ovoid heads $\frac{1}{2}$ –1 in. long, formed of numerous reduced spikes in the axils of leafy bracts. Bracts obovate or ovate to linear-obovate, ciliate. Calyx deeply 4-partite, segments unequal, linear-oblong, obtuse, ciliate. Corolla-tube long, narrow, equalling the calyx; limb small, $\frac{1}{8}$ in. diam., 4-lobed; lobes ovate, acute, spreading or recurved. Capsule small, ovoid-oblong, exceeding the calyx.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350; *Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 380 (*development of seedling*).

SOUTH ISLAND: Nelson—Gordon's Nob, Mount Arthur and Mount Peel, mountains above the Wairau Gorge, *T. F. C.*; Tarndale, *Sinclair*; mountains flanking the Clarence and Waiau Valleys, *Travers, Kirk!* *T. F. C.* Canterbury—Mount Torlesse and Broken River Basin, *Enys!* *Kirk!* *Cockayne!* *T. F. C.*; Ashburton Valley, Godley Glacier, Mount Darwin, *Haast*; Mount Dobson, *T. F. C.* Otago—Mount Arnould, *Petrie!* 3000–6500 ft. December–February.

Very close to *V. Haastii*, and there are forms which are quite intermediate, but in the usual state it is easily separated by the smaller size, sharply recurved leaves, and ciliate bracts and calyx-segments.

60. *V. Petriei*, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 517.—A decumbent or prostrate sparingly branched woody little plant; branches ascending, 3–6 in. long. Leaves not close-set, spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong or linear-oblong, rounded at the apex, narrowed into a short broad petiole, flat, slightly coriaceous, glabrous or the margins minutely glandular-ciliate; the opposite petioles connate at the base and forming a short sheath clasping the branch. Flowering branches clothed with numerous erect linear or linear-lanceolate foliaceous obtuse bracts, each branch ending in a narrow-oblong many-flowered spiciform head $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long. Flowers small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., solitary and sessile in the axils of the bracts, which slightly exceed the calyx. Calyx deeply 4–5-partite; segments very unequal in size, linear, obtuse, minutely ciliate. Corolla hardly exceeding the calyx; tube

cylindrical, longer than the limb, which is 4-lobed, the lobes spreading or reflexed. Stamens included. Capsule small, oblong, turgid. —*Mitrasacme Petriei*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 349, t. 30, f. 1.

SOUTH ISLAND: Otago—Mount Bonpland, *Petrie!* Bold Peak, near Kinloch, *B. C. Aston!*

A most distinct little plant, not nearly allied to any other. The crowded linear bracts are a very remarkable character.

61. **V. dasyphylla**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 519.—A prostrate rigidly coriaceous woody little plant. Stems much branched, 2–6 in. long; branches short, 1–2 in. high, ascending or erect, pubescent, densely leafy, tetragonous, $\frac{1}{4}$ in. diam. with the leaves on. Leaves closely quadrifariously imbricate, opposite pairs connate at the base and forming a short ring clasping the stem, spreading above, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, oblong or oblong-obovate, obtuse, very coriaceous, concave in front, rounded or obscurely keeled at the back; margins ciliate towards the base, cartilaginous above. Flowers large, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., solitary at the tips of the branchlets, sessile. Calyx 5-partite; segments oblong, obtuse, hispid-pubescent towards the base, margins ciliate. Corolla-tube short, broad; limb with 5 large rounded spreading lobes. Stamens 2; filaments short; anthers large, included. Ovary seated in a cupular disc. Capsule altogether included in the calyx, oblong, turgid, coriaceous, 4-valved.—*Logania tetragona*, *Hook. f. Handb. N.Z. Fl.* 188, 737; *Buch. in Trans. N.Z. Inst.* xiv. (1882) 347, t. 28, f. 2.

SOUTH ISLAND: Otago—Lake district, Mount Alta, sounds of the West Coast, *Buchanan!* Old Man Range, Mount Pisa, Ben Lomond, Mount Bonpland, *Petrie!* Mount Kyeburn, *B. C. Aston!* 3500–6000 ft.

A very peculiar species, remarkable for the large terminal flower and 5-lobed calyx and corolla. Sir J. D. Hooker gives the number of stamens as 5, but all the flowers that I have examined are diandrous, and Kirk and Buchanan make the same statement.

62. **V. uniflora**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 522.—A small rigid prostrate little plant, much and closely branched; branches ascending or erect, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, tetragonous, $\frac{1}{8}$ in. diam. with the leaves on. Leaves densely quadrifariously imbricated, opposite pairs connate at the base, ovate-oblong, obtuse, very coriaceous, concave, margins ciliate below. Flowers solitary, terminal, $\frac{1}{4}$ in. diam. Calyx 5-partite; segments linear-oblong, obtuse, hispid-glandular throughout. Corolla 5-lobed; lobes rounded, spreading. Stamens 2, included. Ovary villous at the top. Capsule included in the calyx.—*Logania Armstrongii*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 347, t. 28, f. 3.

SOUTH ISLAND: Otago—Hector's Col, Mount Aspiring, *Buchanan* and *McKay!* 5000 ft.

Probably only a small state of *V. dasphylla*, but I retain it until further specimens can be examined. Buchanan's drawing of it is by no means good, the branches not being nearly so acutely tetragonous as shown by him. I have only seen one indifferent specimen.

63. *V. macrantha*, Hook. f. *Handb. N.Z. Fl.* 213.—A short stout sparingly branched erect shrub 1–2 ft. high; branches erect or spreading, rigid, terete or obscurely tetragonous, glabrous or faintly puberulous above. Leaves $\frac{1}{2}$ –1 in. long, obovate-lanceolate to obovate or broadly oblong-ovate, obtuse or acute, narrowed into a short stout petiole, obtusely serrate, very thick and coriaceous, smooth, flat, glossy, margins thickened. Racemes few or many, axillary, 3–8-flowered; peduncle slender, usually longer than the leaves; bracts narrow-lanceolate. Flowers large, $\frac{3}{4}$ in. diam. pure white; pedicels shorter than the calyx. Calyx deeply 4-partite; segments lanceolate, acuminate, coriaceous, $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Corolla-tube short; lobes 4, broad, rounded. Capsule broadly ovoid, acute, equalling or slightly exceeding the calyx-segments.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350.

SOUTH ISLAND: Alpine grassy slopes from Mount Arthur (Nelson) to Lake Te Anau (Otago), chiefly in the central chain of mountains. 2500–5000 ft. December–February.

One of the most distinct species of the genus, easily recognised by the sparingly branched rigid habit, very coriaceous toothed leaves, and large pure-white flowers. Specimens from Mount Arthur and other parts of the Nelson District have shorter broader leaves, more numerous racemes, and smaller flowers than is usual in Canterbury and Otago, and may be distinguished as var. *brachyphylla*.

64. *V. Benthami*, Hook. f. *Fl. Antarct.* i. 60, t. 39, 40.—An erect branching shrub 2–4 ft. high; branches stout, ringed with the scars of the fallen leaves, naked below, leafy above, younger ones bifariously pubescent. Leaves crowded towards the ends of the branches, sessile, opposite pairs connate at the very base, $\frac{1}{2}$ –1½ in. long, linear-oblong to obovate-oblong, obtuse, narrowed to the base, flat, coriaceous, veinless, entire or with a few coarse serratures above the middle, margins with a line of white down. Racemes terminating the branches, elongated, 1½–3 in. long, many-flowered, clothed with numerous leafy imbricating bracts $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Flowers pedicelled, not exceeding the bracts, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., bright-blue. Calyx deeply 5-partite; segments unequal, oblong-spathulate, margined with white down. Corolla-tube shorter than the calyx; limb 5-lobed, more rarely 3–6-lobed; lobes obovate, obtuse. Stamens 2, rarely 3, short, included. Capsule broadly ovoid, acute, about as long as the calyx.—*Handb. N.Z. Fl.* 214; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350. *V. finaustriana*, *Homb. and Jacq. Voy. au Pole Sud, Dicot.* t. 9, fig. y.

AUCKLAND AND CAMPBELL ISLANDS: Rocky places, abundant, Sir J. D. Hooker, Kirk! Chapman! H. J. Matthews! December–February.

A very distinct and beautiful plant, excellently figured in the "Flora Antarctica." As pointed out by Hooker, abnormal flowers are frequently seen in which the corolla is 6-lobed, with 3 stamens and a 3-celled ovary. Other flowers have a 3-lobed corolla, but with the usual number of stamens and a 2-celled ovary.

65. **V. erecta**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 517.—A sparingly branched shrub 6–18 in. high; branches few, slender, strict, erect, terete, sparingly leafy, puberulous above. Leaves in distant pairs, spreading, sessile, $\frac{3}{4}$ –1 in. long, oblong-lanceolate or obovate-lanceolate, acute, entire or obscurely toothed, subcoriaceous, margins minutely puberulous or ciliate. Racemes 2–6, solitary in the axils of the upper leaves, 3–4 in. long, strict, erect, naked below; rhachis pubescent, as are the bracts and short pedicels. Flowers about $\frac{1}{5}$ in. diam., often obscurely fascicled or whorled. Calyx deeply 4-partite; segments ovate-oblong, acute, ciliate. Corolla-tube short and broad, shorter than the large spreading limb; lobes 4, broadly ovate, acute. Stamens long, exserted; anthers large, broadly ovate. Immature capsule exceeding the calyx, compressed, oblong, acute.

SOUTH ISLAND: Otago—Said to have been collected on Mount Bonpland, but exact locality doubtful.

A species founded on cultivated specimens sent to Mr. Kirk by the late Mr. Martin, of the Fairfield Gardens, near Dunedin. It does not seem to be closely allied to any other New Zealand species, and its strict erect habit and elongated racemes give it a very peculiar appearance. For the present I place it near to *V. Hulkeana*, but more specimens are required before its exact position can be determined.

66. **V. Hulkeana**, *F. Muell. ex Hook. f. Handb. N.Z. Fl.* 213.—A slender erect laxly branched shrub 1–3 ft. high; branches spreading, sparingly leafy, terete, puberulous above. Leaves in remote pairs, spreading, 1–2 in. long, broadly ovate or oblong-ovate, obtuse or acute, obtusely or acutely coarsely serrate, rather fleshy when fresh, dark-green and shining, petiole $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Panicle slender, terminal, much branched, 6–12 in. long by 2–6 in. broad, finely pubescent; branches opposite, the lower ones again compound; bracts minute, $\frac{1}{15}$ in. long, broadly ovate, obtuse, ciliate. Flowers very numerous, small, sessile, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., pale-lilac. Calyx rather narrow, 4-partite; segments ovate, obtuse, ciliate. Corolla tube very short; lobes 4, rounded. Stamens 2; anthers broadly ovate, yellow. Capsule small, oblong, obtuse, twice as long as the calyx. *Bot. Mag.* t. 5484; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350.

Var. **oblonga**, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 518.—Leaves narrow-oblong, 1–3 in. long including the petiole.

Var. **Fairfieldii**, *T. Kirk, l.c.*—Smaller and stouter. Leaves smaller, seldom more than 1 in. long, crenate-dentate, with reddish margins. Panicle shorter and broader. Calyx-segments narrower, linear-oblong, pubescent. — *V. Fairfieldii*, *Hook. f. Bot. Mag.* t. 7323.

SOUTH ISLAND: Marlborough—Lower Wairau, *Travers*, *Monro*; *Macrae's Run*, *Monro*; *Awatere Valley*, *MacMahon*! *Kirk*! *Kaikoura Mountains*, *Sinclair*, *Buchanan*! *Kirk*! *Canterbury*—Hills in the northern part of the province, *Armstrong*! *Var. oblonga*: *Marlborough*—*Awatere Valley*, *Kirk*! *J. H. MacMahon*! *Mount Fyffe*, *Cockayne*! *Sea-level to 3000 ft.* *November-December.*

A handsome species, better known in cultivation than in a wild state. *Mr. H. J. Matthews* informs me that the var. *Fairfieldii*, which was described as a distinct species by *Hooker*, originally appeared in the *Fairfield Gardens*, near *Dunedin*, where many species of *Veronica* are cultivated, and has never been found in a wild state. It is probably a hybrid between *V. Hulkeana* and *V. Lavaudiana*.

67. **V. Lavaudiana**, *Raoul*, *Choix Pl. Nouv. Zel.* 16, t. 10.—A small sparingly branched shrub 3–9 in. high; branches rather stout, decumbent at the base, then erect, leafy, terete, glabrous below, puberulous above. Leaves rather crowded, spreading, $\frac{1}{3}$ –1 in. long, broadly obovate or obovate-spathulate, rounded at the tip, gradually narrowed into a short stout petiole, crenate-serrate, very coriaceous, dark-green usually margined with red. Spikes short, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, arranged in a broad hemispherical many-flowered corymb sometimes 2 in. diam. or more; peduncle rather long, erect, and with the pedicels glandular-pubescent; bracts ovate or ovate-lanceolate, pilose and ciliate. Flowers small, sessile, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Calyx 4-partite; segments ovate-lanceolate, acuminate, pubescent. Corolla-tube rather longer than the calyx; lobes 4, spreading, unequal, obtuse. Capsule exceeding the calyx, oblong, obtuse, pubescent.—*Hook. f. Fl. Nov. Zel.* i. 195; *Handb. N.Z. Fl.* 214; *Bot. Mag.* t. 7210; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350.

SOUTH ISLAND: *Canterbury*—Abundant in rocky places on *Banks Peninsula*, *Raoul*, *Lyall*, &c.; river-beds of the *Canterbury Plains*, rare, *Lyall*, *Travers*, *Armstrong*! *Sea-level to 2500 ft.* *November-December.*

68. **V. Raoulii**, *Hook. f. Handb. N.Z. Fl.* 214.—A stout much-branched woody little shrub 4–12 in. high; branches often procumbent below, terete, ringed with the scars of the fallen leaves, leafy above, pubescent. Leaves spreading or suberect, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, oblong-spathulate, obtuse or acute, gradually narrowed into a rather long petiole, crenate-serrate, very thick and coriaceous, yellow-green, flat, veinless. Spikes very short, either arranged in a broad terminal panicle or corymb 1–2 in. across, or forming smaller lateral corymbs or heads; peduncles and pedicels puberulous; bracts ovate, ciliate. Flowers small, sessile, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam. Calyx 4-partite; segments ovate-oblong, obtuse, ciliate. Corolla-tube short; lobes 4, broadly oblong, rounded. Capsule exceeding the calyx, oblong, obtuse.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 350; *Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 379 (*development of seedling*).

SOUTH ISLAND: Nelson—Upper Wairau, *Travers*, *Monro*; Upper Clarence, *Jollies' Pass*, *Jack's Pass*, &c., *T. F. C.*; Waiau Valley, *Kirk*! Canterbury—Banks Peninsula, *Raoul*, *Armstrong*! Kowai River, *Haast*, *Petrie*! Broken River basin, *Enys*! *Kirk*! *Cockayne*! *T. F. C.* 500–3500 ft. October–November.

69. **V. pulvinaris**, *Hook. f. and Benth. Gen. Plant.* ii. 964.—A small densely tufted hoary moss-like plant, forming soft rounded cushions 1–3 in. diam.; branches closely compacted, $\frac{1}{8}$ in. diam. Leaves very densely imbricate, $\frac{1}{10}$ in. long, linear-oblong or linear-spathulate, obtuse or subacute, not coriaceous, quite entire, the margins and both surfaces above the middle hispid with copious long white hairs. Flowers terminal, solitary, very shortly pedicelled, about $\frac{1}{8}$ in. long, white. Calyx deeply 5-partite; segments linear, ciliate. Corolla salver-shaped; tube narrow, slightly longer than the calyx; limb flat, spreading, 5-lobed. Stamens included; filaments very short. Ovary pilose at the tip. Capsule not seen.—*Pygmea pulvinaris*, *Hook. f. Handb. N.Z. Fl.* 217; *Ic. Plant.* t. 1047; *Buch. in Trans. N.Z. Inst.* xiv. (1882) 352, t. 32, f. 2.

SOUTH ISLAND: Mountains of Nelson, Marlborough, and Canterbury, abundant. 3500–6500 ft.

This and the two following species differ from *Veronica* in the 5- or 6-partite corolla and in the leaves not being quadrifariously arranged, and constituted the genus *Pygmea* of the Handbook. In the "Genera Plantarum" the genus was reduced to a section of *Veronica*, and this view has also been followed by Wettstein in "Die Naturlichen Pflanzenfamilien."

70. **V. Thomsoni**, *Cheesem.*—Very similar in most respects to *V. pulvinaris*, but rather larger and stouter. Leaves very densely imbricate, $\frac{1}{10}$ in. long, rhomboid-obovate or obovate-oblong, obtuse or subacute, somewhat thick and fleshy towards the tip, membranous towards the base, quite entire, usually copiously hispid on the margins and back above the middle, upper surface often glabrous. Flowers solitary, terminal, rather larger than in *V. pulvinaris*. Calyx deeply 5-partite; segments linear, obtuse, ciliate. Corolla-tube much longer than the calyx; limb spreading, 5-lobed. Stamens included; filaments very short. Ovary pilose at the tip. Capsule narrowly obcordate, turgid, about as long as the calyx.—*Pygmea Thomsoni*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 353, t. 32, f. 3.

Var. **glabra**.—Glabrous, or with a few scattered hairs on the margins of the leaves.

SOUTH ISLAND: Otago—Mount Alta, *Buchanan* and *McKay*! Kurow Mountains, Mount St. Bathans, Mount Pisa, *Petrie*! 4500–6500 ft.

Very near to *V. pulvinaris*, but the leaves are broader and the corolla larger, with a much longer tube. It is easily confounded with *Myosotis pulvinaris*.

71. **V. ciliolata**, *Hook. f. and Benth. Gen. Plant.* ii. 964.—A small densely tufted moss-like plant, forming rounded cushions

1-3 in. diam.; branches rather stout, $\frac{1}{2}$ -1 in. high, rarely more, with the leaves on $\frac{1}{2}$ - $\frac{1}{4}$ in. diam. Leaves densely imbricate, $\frac{1}{8}$ in. long, broadly obovate-spathulate, rounded at the tip, coriaceous, quite entire, both surfaces glabrous or nearly so, margins ciliate from below the middle with long stiff white hairs. Flowers solitary, terminal, sessile or nearly so, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, white. Calyx deeply 5-partite; segments linear-spathulate, ciliate. Corolla salver-shaped; tube cylindrical, rather longer than the calyx; limb flat, spreading, 5- or rarely 6-lobed; lobes oblong, obtuse. Stamens usually included; filaments short; anthers large. Ovary glabrous. Capsule not seen.—*Pygmea ciliolata*, Hook. f. *Handb. N.Z. Fl.* 217; *Ic. Plant.* t. 1047; *Buch. in Trans. N.Z. Inst.* xiv. (1882) 352, t. 32, f. 1.

SOUTH ISLAND: Nelson—Discovery Peaks, *Travers*. Canterbury—Hopkins River, *Haast*. Otago—Mount Alta and Hector's Col, *Buchanan!* 5000-6500 ft.

Distinguished from the two preceding by the stouter branches and more coriaceous broader leaves, ciliate on the margins only. When dry the margins of the leaves are incurved, the hairs all pointing inwards.

72. *V. loganioides*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 359. —A dwarf shrub 6-14 in. high; stems woody, decumbent at the base, erect above; branches numerous, slender, terete, leafy above, ringed with the scars of the fallen leaves below, pubescent or almost villous with lax soft greyish-white hairs. Leaves decussate, in rather close-set opposite pairs, erecto-patent, sessile, $\frac{1}{8}$ - $\frac{1}{6}$ in. long, ovate-lanceolate, acute, entire or sometimes with one or two small teeth on each side, dull-green, coriaceous, keeled. Racemes near the tips of the branches, forming a small corymb-like head, short, few-flowered, rhachis and pedicels pubescent or almost villous. Flowers $\frac{1}{4}$ in. diam., white or white with pink veins. Calyx deeply 4-partite; segments ovate-oblong, acute, ciliate. Corolla-tube broad and short, not equalling the calyx; limb 4-lobed; dorsal and lateral lobes subequal, orbicular-oblong, obtuse; anticus lobe narrower, oblong. Capsule elliptical-oblong, didymous, turgid, notched at the tip, rather shorter than the calyx. —*Hook. f. Bot. Mag.* t. 7404.

SOUTH ISLAND: Canterbury—Rangitata Valley, *Armstrong!* Clyde Valley, *W. Gray*.

A very remarkable plant, of dubious affinity, quite unlike any other. Mr. Kirk has pointed out that the capsule is didymous, with the septum across the narrowest diameter; and the short tube of the corolla and large rounded lobes also show a relationship to the herbaceous section of the genus. But the habit of the plant, with its woody stems and small close-set leaves, is nearer that of the section including *V. lycopodioides* and its allies. Mr. Armstrong's original description is by no means characteristic of the specimens cultivated by him in the Christchurch Botanical Gardens.

73. **V. linifolia**, *Hook. f. Handb. N.Z. Fl.* 214.—A small much and diffusely branched procumbent herb; branches slender, often rooting below, ascending at the tips, terete, glabrous, 2-9 in. long or more. Leaves numerous, closely placed, spreading, $\frac{1}{3}$ -1 in. long, $\frac{1}{10}$ - $\frac{1}{8}$ in. broad, linear, obtuse at the tip, narrowed into a rather long broad petiole, flat, subcoriaceous, quite entire; margins of petiole ciliate. Racemes 1-3 towards the ends of the branches, 1-2 in. long, slender, naked below, 2-5-flowered; bracts $\frac{1}{3}$ - $\frac{1}{2}$ in. long, linear, obtuse; pedicels long, $\frac{1}{4}$ -1 in., slender, curved. Flowers large, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., white or pale-rose. Calyx $\frac{1}{3}$ in. long, deeply 4-partite; segments linear-oblong, obtuse. Corolla-tube very short; limb broad, spreading, 4-lobed; lobes broad, rounded, veined. Stamens equalling the corolla-lobes. Capsule broadly obcordate, rather shorter than the calyx.—*Armstr. in Trans. N.Z. Inst.* xiii. (1881) 349.

SOUTH ISLAND: Nelson—Mount Owen, *W. Townson*! Mount Franklin, *Park*; Lake Tennyson, *T. F. C.* Canterbury—Broken River, *Petrie*! Craigieburn Mountains, *Cockayne*; Upper Waimakariri, *Enys*! *T. F. C.*; Ashburton Mountains, *Potts*! Clyde Glacier and Mount Darwin, *Haast*. Westland—Otira Valley, *T. F. C.*; Okarito, *A. Hamilton*. Otago—Lake Wanaka, *Buchanan*! mountains near Arrowtown, *Petrie*! 1500-4500 ft. December-January.

A very distinct and well-marked plant.

74. **V. catarractæ**, *Forst. Prodr. n.* 9.—Stems slender, terete, sparingly branched, suberect, or prostrate below and then ascending, 6-24 in. long, glabrous or bifariously pubescent, woody at the base. Leaves rather distant, shortly petiolate, spreading, 1-4 in. long, lanceolate or ovate-lanceolate, acuminate, coarsely and sharply serrate, coriaceous or submembranous, flat, 1-nerved, paler beneath. Racemes few or many towards the tips of the branches, solitary and axillary, slender, curved or erect, 3-9 in. long, many-flowered; pedicels slender, puberulous, $\frac{1}{3}$ -1 in. long; bracts linear-subulate. Flowers $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., white or pale-rose. Calyx deeply 4-partite; segments ovate-lanceolate or oblong-ovate, acute or acuminate. Corolla with a very short tube and 4 rounded spreading lobes. Capsule broadly oblong, turgid, emarginate or almost 2-lobed, usually about $\frac{1}{3}$ longer than the calyx.—*A. Rich. Fl. Nouv. Zel.* 189; *A. Cunn. Precur. n.* 380; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 195; *Handb. N.Z. Fl.* 216. *V. irrigans*, *Kirk in Trans. N.Z. Inst.* ii. (1870) 94.

Var. **lanceolata**, *Hook. f. Fl. Nov. Zel.* i. 195.—Stems shorter and more slender. Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, $\frac{1}{12}$ - $\frac{1}{8}$ in. broad, linear or narrow linear-lanceolate.—*Handb. N.Z. Fl.* 216. *V. lanceolata*, *Benth. in. D.C. Prodr.* x. 462.

Var. **diffusa**, *Hook. f. Handb. N.Z. Fl.* 216.—Procumbent, diffusely branched. Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, ovate or ovate-oblong, acute. Calyx-segments ovate, acute.—*V. diffusa*, *Hook. f. Ic. Plant. t.* 645; *Fl. Nov. Zel.* i. 195.

NORTH AND SOUTH ISLANDS: From the Thames goldfields to the south of Otago, but often local. Most plentiful on the west coast of the South Island. Sea-level to 3000 ft. November-January.

An exceedingly variable plant. Forster's type, judging from the description given by A. Richard, is a rather small-leaved state, with lanceolate leaves 1-2 in. long; and according to Mr. N. E. Brown corresponds to the var. *minor* of the "*Flora Novæ-Zelandiæ*." But it passes insensibly into a much more luxuriant state, with leaves sometimes over 4 in. long, and with longer racemes. This again varies into var. *lanceolata*, Mr. Kirk's *V. irrigans* being about half-way between the two. Var. *diffusa* is also connected by numerous intermediates.

75. **V. Lyallii**, Hook. f. *Fl. Nov. Zel.* i. 196.—Stems slender, prostrate and rooting, much and diffusely branched, 3-18 in. long, more rarely suberect from a prostrate base; branches terete, usually bifariously pubescent, sometimes conspicuously so, rarely almost glabrous. Leaves shortly petioled, spreading, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, broadly ovate or almost orbicular to oblong-ovate, obtuse or subacute, with 2 or 3 coarse blunt serratures on each side, thick and coriaceous, glabrous, often reddish on the midrib beneath and on the petiole. Racemes several, few- or many-flowered, on slender erect peduncles 2-6 in. long usually springing from near the ends of the branches but sometimes lateral, glabrous or more or less pubescent; pedicels slender, the lowest $\frac{1}{2}$ in. long or more. Flowers $\frac{1}{8}$ in. diam., white with pink veins. Calyx deeply 4-partite; segments ovate-oblong, acute, margins ciliolate. Corolla-tube very short; limb broad, spreading, with 4 rounded lobes. Stamens shorter than the corolla-lobes. Capsule broadly obovate-oblong, turgid, 2-lobed or enarginate, exceeding the calyx.—*Handb. N.Z. Fl.* 215; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 349.

Var. **suberecta**, Cheesem.—Stem woody at the base; branches slender, wiry, erect or suberect. Leaves usually narrower, oblong or obovate-oblong, with coarser and more numerous teeth, sometimes almost lobed.—*V. Lyallii* var. **β**, Hook. f. *Fl. Nov. Zel.* i. 196.

NORTH ISLAND: Ruahine and Tararua Mountains, apparently not common. SOUTH ISLAND: Hilly or mountainous districts, abundant, especially on the west side of the Island. Sea-level to 4500 ft. November-March.

A very variable little plant, but on the whole recognised without much difficulty by the prostrate and diffusely branched mode of growth, small broad glabrous leaves, and slender many-flowered racemes of rather large flowers. *V. catarractæ* is a much taller and more erect plant, with much longer and narrower leaves and larger flowers. *V. Bidwillii* differs in its smaller leaves and longer strict racemes. *V. Olseni* is smaller and stouter, with more of the habit of *V. Hookeriana*, and has more pubescent racemes and fewer flowers; while *V. Hookeriana* is separated by the stouter and more rigid habit, pubescent leaves, and much stouter glandular-pubescent raceme with fewer white flowers. The *V. Lyallii* of the *Botanical Magazine* (t. 6456) seems to me to be quite different from the true *Lyallii* in the greater size, erect habit, larger ovate acute leaves, and larger flowers, and probably represents a distinct species intermediate between *V. Lyallii* and *V. catarractæ*, but I have seen no specimens.

76. **V. Bidwillii**, Hook. *Ic. Plant.* t. 814.—Stems slender, prostrate and rooting, much branched, woody at the base, 3-12 in. long; branches creeping, often matted, glabrous or pubescent. Leaves rather distant, shortly petioled or almost sessile, minute, $\frac{1}{10}$ - $\frac{1}{4}$ in.

long, broadly oblong or obovate, obtuse, with 1 or 2 deep notches on each side or entire, thick and coriaceous, black when dry. Peduncles axillary, remote from the ends of the branches, very long, 3-9 in., slender, strict, erect, glabrous or puberulous, few- or many-flowered; pedicels slender, erect, $\frac{1}{4}$ - $\frac{1}{2}$ in. long; bracts small, oblong or linear-oblong, obtuse. Flowers about $\frac{1}{3}$ in. diam. Calyx 4-partite; segments ovate or oblong, obtuse. Corolla-tube very short; limb with four spreading rounded lobes. Stamens shorter than the corolla-lobes. Capsule broadly oblong, retuse, exceeding the calyx.—*Hook. f. Fl. Nov. Zel. i.* 196; *Handb. N.Z. Fl.* 215; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 349.

SOUTH ISLAND: Not uncommon in mountain districts as far south as central Otago, usually on shingle-beds by the sides of streams, ascending to 4000 ft. November-February.

A much more prostrate plant than *V. Lyallii*, with smaller leaves which usually have only one or two serratures on each side, and with very long strict peduncles.

77. **V. Hookeriana**, *Walp. Rep.* iii. 341.—A small stout much or sparingly branched prostrate herb 3-10 in. long; branches short, stout, ascending, leafy, glandular-pubescent. Leaves crowded, very shortly petiolate, spreading, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, broadly ovate or oblong-ovate, obtuse, coarsely and obtusely crenate, thick and coriaceous, rigid, often black when dry, pubescent on both surfaces or glabrous above. Peduncles usually several, lateral or near the tips of the branches, 1-2 in. long, stout, erect, densely pubescent, bearing a 4-8-flowered corymbose raceme at the top; bracts, pedicels, and calyces densely glandular-pubescent. Flowers $\frac{1}{4}$ - $\frac{1}{3}$ in. diam., white or white streaked with pink. Calyx 4-partite; segments ovate, obtuse. Corolla-tube very short; limb broad, spreading, 4-lobed; lobes rounded. Stamens rather shorter than the lobes. Capsule broadly oblong, about one-third longer than the calyx when mature.—*V. nivea*, *Hook. f. Ic. Plant. t.* 640 (*not of Lindl.*). *V. nivalis*, *Benth. in D.C. Prodr.* x. 477; *Hook. f. Fl. Nov. Zel. i.* 196; *Handb. N.Z. Fl.* 215. *V. compacta*, *Col. in Trans. N.Z. Inst.* xx. (1888) 202.

NORTH ISLAND: Tongariro and Ngauruhoe, *Bidwill, Hill!* Ruapehu, *Kirk! Rev. F. H. Spencer! Petrie!* 3000-5000 ft.

The usual state of this plant is excellently figured in the "*Icones Plantarum*." Its distinguishing characters are the stout habit, rather large closely placed almost sessile rigid and coriaceous leaves, stout glandular-pubescent peduncles, and short corymbose racemes of rather large flowers.

78. **V. Olseni**, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 607.—Stems prostrate, sparingly branched; branches short, rooting at the nodes, densely pubescent with short spreading hairs. Leaves shortly petioled, rather close-set, spreading, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, broadly ovate or almost orbicular, obtuse, deeply and coarsely serrate,

thick and coriaceous, glabrous, dark-green. Racemes many-flowered, on strict erect densely pubescent lateral peduncles 3-5 in. long; pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. long, slender. Flowers $\frac{1}{4}$ - $\frac{1}{3}$ in. diam., white with pink veins. Calyx deeply 4-partite; segments broadly ovate, obtuse, margins ciliate. Corolla-tube very short, limb with 4 rounded spreading lobes. Stamens shorter than the corolla-lobes. Capsule broadly oblong, turgid, emarginate, one-third as long again as the calyx.

NORTH ISLAND: Ruahine Range, Colenso! Olsen! Petrie! 2000-4000 ft. December-March.

I retain this as a species for the present, although far from satisfied as to its distinctness from *V. Hookeriana*, from which it differs mainly in the more slender mode of growth, glabrous leaves, more slender and less pubescent many-flowered racemes, and in the narrower capsule. It is apparently intermediate between *V. Hookeriana* and *V. Lyallii*.

79. *V. spathulata*, Benth. in D.C. Prodr. x. 477. — A small prostrate excessively branched pubescent little plant, forming dense patches 3-9 in. across; branches short, stout, ascending, leafy, clothed with crisped white hairs. Leaves crowded, spreading, petiolate, $\frac{1}{6}$ - $\frac{1}{2}$ in. long including the petiole, ovate-spathulate or deltoid-spathulate, obtuse, coarsely crenate or crenate-lobed, thick and coriaceous, black when dry, more or less hairy on both surfaces; petiole about as long as the blade, broad, channelled. Peduncles near the tips of the branches, short, stout, pubescent, equalling the leaves or nearly twice as long as them, 2-5-flowered; bracts foliaceous, and with the pedicels and calyces densely pubescent. Flowers $\frac{1}{4}$ in. diam., white. Calyx 4-partite; segments oblong or obovate-oblong, obtuse. Corolla-tube short; limb broad, 4-lobed, lobes rounded. Stamens 2, shorter than the corolla-lobes. Capsule equalling or slightly exceeding the calyx, broadly obcordate, pubescent.—*Hook. f. Fl. Nov. Zel.* i. 197; *Handb. N.Z. Fl.* 216; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 349. *V. vulcanica*, Col. in *Trans. N.Z. Inst.* xx. (1888) 203. *V. subrosulata*, Col. l.c. xxxi. (1899) 278.

NORTH ISLAND: Tongariro, Bidwill; Ruapehu, Tryon! Hill! Petrie! Rev. F. H. Spencer! Ruahine Mountains, Hill! 3000-6000 ft.

Nearest to *V. Hookeriana*, but more depressed and much more branched, leaves spathulate on longer petioles, peduncles much shorter, and capsule broader and obcordate.

80. *V. plebeia*, R. Br. Prodr. 435.—Stems slender, leafy, prostrate and rooting, much and diffusely branched, elongated, 1-3 ft. long, usually minutely pubescent. Leaves on rather long petioles; blade $\frac{1}{2}$ -1 in. long, broadly ovate or deltoid, obtuse or subacute, cordate or truncate at the base, coarsely and irregularly acutely toothed, 3-nerved, glabrous or sparsely hairy. Racemes lateral, axillary, pedunculate, 2-5 in. long, slender, loosely 5-10-flowered; 18—Fl.

pedicels spreading, $\frac{1}{3}$ – $\frac{1}{2}$ in. long; bracts linear-obovate. Flowers small, $\frac{1}{6}$ in. diam. Calyx 4-partite; segments obovate-oblong, obtuse or subacute, enlarging in fruit. Corolla-tube very short; limb with 4 rounded lobes. Stamens shorter than the corolla-lobes. Capsule transversely oblong or orbicular, compressed, slightly emarginate, altogether included in the enlarged calyx.—*Benth. Fl. Austral.* iv. 510. *V. elongata*, *Benth. in D.C. Prodr.* x. 478; *Hook. f. Fl. Nov. Zel.* i. 197; *Handb. N.Z. Fl.* 216. *V. calycina*, *A. Cunn. Precur.* n. 382 (not of *R. Br.*).

NORTH ISLAND.—In lowland situations from the North Cape to the Thames River, rare and local.

81. **V. Anagallis**, *Linn. Sp. Plant.* 12.—Stems stout, succulent, glabrous, decumbent at the base, then erect, simple or sparingly branched, 6–18 in. high. Leaves sessile and semiamplexicaul, 1–3 in. long, oblong-lanceolate or linear-oblong, subacute or obtuse, often cordate at the base, more or less serrate or almost entire, membranous when dry. Racemes numerous towards the ends of the branches, axillary, suberect, 4–10 in. long, many-flowered; bracts small, linear or lanceolate. Flowers small, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., pale-blue or almost white. Calyx 4-partite; segments ovate-oblong, obtuse or subacute. Corolla-tube very short; limb 4-lobed, spreading. Capsule broadly oblong, notched, shorter than the calyx.—*Hook. f. Fl. Nov. Zel.* i. 197; *Handb. N.Z. Fl.* 216.

NORTH ISLAND: Hawke's Bay, watery places, *Colenso*!

This has not been observed since its original discovery by Mr. Colenso, more than fifty years ago. Although a widely distributed plant in the Northern Hemisphere it is unknown in the southern, except in South Africa, where it is supposed to be an introduction, and in New Zealand. Possibly Mr. Colenso's specimens were introduced as well; but if so, it is remarkable that the plant should have apparently disappeared.

82. **V. Muelleri**, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 351, t. 32.—Stems prostrate or rooting, branched, 6–18 in. long, putting up numerous short suberect branchlets $\frac{1}{2}$ –2 in. long. Leaves crowded towards the tips of the branchlets, spreading, petioled, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, linear-obovate to ovate-oblong, obtuse, entire or with 1 or 2 coarse notches on each side, coriaceous, glabrous or the petioles ciliate on the margins. Flowers solitary and axillary at the tips of the branches, almost hidden by the leaves, sessile or shortly pedicelled, $\frac{1}{3}$ in. diam. Calyx 4-partite; segments linear-obovate, obtuse. Corolla-tube rather long, exceeding the calyx; limb spreading, 4-lobed. Stamens shorter than the corolla-lobes. Capsule equalling the calyx or rather shorter than it, transversely oblong, didymous.

SOUTH ISLAND: Otago—Hector's Col, Mount Aspiring Range, alt. 5000 ft., *Buchanan and McKay*!

Of this I have only seen two very indifferent specimens in Mr. Buchanan's herbarium, both long past flower. It is clearly a very distinct species, and, if Mr. Buchanan's plate is correct, differs widely from all the New Zealand species belonging to the section with didymous capsules in the elongated tube of the corolla.

83. **V. Cheesemanii**, *Benth. in Hook. Ic. Plant. t. 1366A.*—Small, greyish-green, densely tufted, forming rounded cushions 2–5 in. diam., pubescent in all its parts; branches slender, closely compacted. Leaves spreading, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, narrow-obovate, obtuse, coarsely and obtusely toothed or lobed, puberulous on both surfaces, narrowed into a long or short broad petiole. Flowers solitary and axillary, subsessile, small, white, $\frac{1}{8}$ in. diam. Calyx deeply 4-partite, segments linear-spathulate, spreading, coarsely toothed towards the tip. Corolla slightly longer than the calyx; tube very short; limb with 4 obovate emarginate lobes. Stamens shorter than the corolla-lobes. Ovary broadly ovoid, hispid. Capsule shorter than the calyx, broadly didymous, slightly compressed, hispid, 4-valved to the base.—*Cheesem. in Trans. N.Z. Inst. xv. (1883) 299.*

SOUTH ISLAND: Nelson—Summit of Gordon's Nob and the Raglan Mountains, *T. F. C.*; Mount Starveall, *F. G. Gibbs!* Canterbury—Shingle-slopes near the source of the Otira River, *T. F. C., Cockayne!* 3500–5500 ft.

A peculiar little plant, with much of the aspect of a small *Euphrasia*.

84. **V. canescens**, *T. Kirk in Trans. N.Z. Inst. ix. (1877) 503, t. 19.*—A small creeping and rooting herb with intricately branched stems 1–4 in. long, often forming broad matted patches, everywhere hispid with greyish-white hairs. Leaves minute, spreading, shortly petioled or subsessile, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, obtuse, entire, more or less densely clothed on both surfaces with curved hispid hairs. Flowers solitary and axillary, large for the size of the plant, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., pale-blue; peduncles short, slender, $\frac{1}{4}$ in. long, with two hispid bracts below the middle. Calyx 4–5-partite; segments linear-oblong, hispid. Corolla-tube very short; limb spreading, 4-lobed; lobes unequal, oblong, often emarginate. Capsule small, broadly oblong, slightly compressed, retuse, altogether included in the calyx.—*Trans. N.Z. Inst. xxviii. (1896) 516.*

SOUTH ISLAND: Canterbury—Lake Forsyth, *Kirk!* Lake Ellesmere, *Armstrong!* Lake Lyndon, *Enys!* *Kirk!* *T. F. C.*; Mackenzie Plains, Lakes Tekapo and Pukaki, *T. F. C.* Otago—Near Oamaru, *Buchanan!* central Otago, plentiful, *Petrie!* Wycliffe Bay, near Dunedin, *B. C. Aston!* Sea-level to 3000 ft. December–March.

Usually found on the dried-up margins of lakes and pools. It is probably not uncommon in suitable localities on the eastern side of the South Island, but is easily overlooked, except when in flower.

8. OURISIA, Comm.

Perennial herbs, erect or decumbent or more or less prostrate. Leaves opposite, mostly radical, entire or more usually crenate.

Flowers axillary and solitary, or racemose or subumbelled on a scapiform peduncle. Calyx 5-lobed or 5-partite. Corolla more or less oblique or curved; tube long or short; lobes 5, spreading, imbricate in the bud, one of the lateral ones on the outside. Stamens 4, didynamous, included; filaments short; anthers reniform, the cells diverging at the base, confluent at the tip. Ovary 2-celled; style filiform; stigma capitate; ovules numerous in each cell. Capsule 2-celled, turgid or sub-compressed, grooved on each side, loculicidally 2-valved, the placentas attached to the middle of the valves. Seeds numerous; testa loose, reticulate.

A handsome genus of about 20 species, confined to Andine South America, New Zealand, and Tasmania. All the New Zealand species are endemic.

A. Erect or decumbent at the very base. Leaves all radical. (Stems often creeping in O. sessilifolia).

- | | |
|--|-----------------------------|
| Stout, glabrous or nearly so, 9-24 in. high. Leaves coriaceous, long-petioled. Upper bracts whorled. Flowers $\frac{3}{4}$ -1 in. diam. | 1. <i>O. macrocarpa</i> . |
| More slender, pubescent or pilose, 6-24 in. high. Leaves submembranous, long-petioled. Upper bracts whorled. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. | 2. <i>O. macrophylla</i> . |
| Small, slender, pubescent, 2-9 in. high. Leaves submembranous, long-petioled. Upper bracts in pairs, rarely in threes. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. | 3. <i>O. Colensoi</i> . |
| Stout, most densely glandular-hairy, 2-6 in. high. Leaves obovate, narrowed into short broad petioles. Bracts in pairs. Flowers $\frac{3}{4}$ in. diam. | 4. <i>O. sessilifolia</i> . |

B. Creeping, often matted or cæspitose. Leaves close-set along the creeping stem, usually distichous.

- | | |
|---|----------------------------|
| Glabrous or nearly so. Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., ovate-spathulate, thickly coriaceous, crenate. Flowers $\frac{3}{4}$ -1 in. diam. | 5. <i>O. Cockayneana</i> . |
| Glabrous or nearly so. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., obovate-spathulate, thickly coriaceous, entire or with 2-3 deep notches | 6. <i>O. cæspitosa</i> . |
| Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., upper surface densely glandular-pubescent. Peduncles and bracts sparingly pubescent | 7. <i>O. prorepens</i> . |
| Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., margins ciliate with long jointed hairs. Peduncles and bracts thickly glandular-pubescent | 8. <i>O. glandulosa</i> . |

1. *O. macrocarpa*, Hook. f. *Fl. Nov. Zel.* i. 198.—Stems stout, erect from a short thick creeping rhizome, 9-24 in. high, purplish below, glabrous or with faint hairy lines decurrent from the bases of the bracts. Radical leaves numerous, on stout petioles 2-6 in. long; blade 1-5 in., ovate-oblong to broadly oblong or orbicular, obtuse or subacutè, cuneate at the base or narrowed into the petiole, crenate, dark-green above, paler beneath, very thick and coriaceous, quite glabrous except the margins towards the base, which are ciliate. Flowering-stem very stout. Cauline leaves 1 or 2 pairs, ovate or oblong, almost connate at the base, sessile. Inflorescence of 4-8 superposed whorls of pedicelled flowers. Bracts 3-6 in a whorl, oblong or oblong-lanceolate, coriaceous,

crenate. Flowers large, $\frac{3}{4}$ –1 in. diam., white; pedicels 1–3 in. long. Calyx deeply 5-partite; segments $\frac{1}{3}$ in. long, linear-oblong, obtuse, coriaceous, glabrous or the margins alone ciliate. Corolla-tube short and broad, villous within; lobes obovate, retuse. Capsule $\frac{1}{3}$ – $\frac{1}{2}$ in. long, ovoid-oblong.—*Handb. N.Z. Fl.* 218. *O. calycina*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 97.

SOUTH ISLAND: Nelson—Mount Franklin, *Park*. Canterbury—Arthur's Pass, *Kirk! T. F. C.*; Ashburton Mountains, *T. H. Potts!* Mount Cook district, *T. F. C.* Westland—Kelly's Hill, Rangitaipo, *Petrie!* Franz Joseph Glacier, *Haast*. Otago—Sounds of the south-west coast, *Lyall, Buchanan!* Clinton Valley, *Petrie!* Sea-level to 3500 ft. November–January.

The finest species of the genus. It is allied to the following, but is easily separated by the much stouter and more coriaceous habit, by being nearly glabrous, and by the larger flowers and capsules.

2. *O. macrophylla*, *Hook. Ic. Plant.* t. 545, 546.—Erect from a short stout decumbent rhizome, 6–24 in. high, more or less pubescent or pilose with soft spreading hairs, rarely almost glabrous. Radical leaves variable in size and shape, on long petioles; petioles 1–6 in. long, stout or slender, sheathing at the base; blade 1–5 in., ovate or ovate-oblong to orbicular-oblong, obtuse, oblique and cordate or cuneate at the base, crenate, rather thin and membranous, sparsely pubescent or almost glabrous. Flowering-stem erect, rather stout or slender. Cauline leaves 1 or rarely 2 pairs, ovate, sessile. Inflorescence of 3–7 superposed whorls of pedicellate flowers, in small varieties sometimes reduced to a few-flowered terminal umbel. Bracts 3–8 in a whorl, linear-oblong or linear-obovate to linear, crenate. Flowers large, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., white or white with purplish streaks; pedicels $\frac{1}{2}$ –2 in. long, slender, erect. Calyx deeply 5-partite; segments $\frac{1}{4}$ in. long, lanceolate or linear, glandular-hairy. Corolla-tube slightly curved, villous within; lobes obovate, retuse. Capsule $\frac{1}{4}$ in. long, ovoid-oblong, turgid, membranous.—*Hook. f. Fl. Nov. Zel.* i. 197; *Handb. N.Z. Fl.* 218. *O. robusta*, *Col. in Trans. N.Z. Inst.* xvii. (1886) 246.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in damp mountainous localities from Moehau (Cape Colville) southwards. Sea level to 4500 ft. November–January.

In its fully developed state this is an exceedingly handsome plant. It is perhaps nowhere more abundant than on Mount Egmont, where it was originally discovered by Dieffenbach.

3. *O. Colensoi*, *Hook. f. Handb. N.Z. Fl.* 218. — Rhizome slender, creeping; stems erect, 2–9 in. high, pilose with soft spreading hairs. Leaves all radical, on slender petioles $\frac{1}{2}$ –1 in. long; blade about the same length, oblong or ovate-oblong, obtuse, subcordate or cuneate at the base, crenate, rather membranous, sparsely glandular-hairy on both surfaces or almost glabrous. Flowering-stem or scape 1–8-flowered; bracts in pairs or rarely in

threes, linear-oblong, crenate. Flowers $\frac{1}{2}$ in. diam., white; pedicels $\frac{1}{4}$ –1 in. long. Calyx 5-partite; segments linear, glandular-pubescent. Corolla-tube short, curved; lobes obovate, retuse. Capsule broadly oblong, turgid.

NORTH AND SOUTH ISLANDS: Mountainous districts from Lake Taupo and the Ruahine Mountains southwards. 1500–3500 ft. December–January.

Probably only a reduced state of *O. macrophylla*.

4. *O. sessilifolia*, Hook. f. *Handb. N.Z. Fl.* 218.—Rhizome stout or slender, creeping and rooting, branched, glandular-hairy above. Leaves all radical, spreading and appressed to the surface of the ground, 1–2 in. long, broadly ovate- or obovate-spathulate, obtuse, suddenly narrowed into broad short petioles, crenate, scarcely coriaceous, pale-green, upper surface and margins densely villous with glandular hairs, under-surface not so thickly clothed but rarely glabrate. Peduncle stout, 2–6 in. high, 2–8-flowered, most densely villous, as are the bracts, pedicels, and calyces. Bracts obovate or oblong, crenate; pedicels short, stout. Flowers large, $\frac{3}{4}$ in. diam., white shading into purple at the base. Calyx $\frac{1}{3}$ in. long, 5-partite; segments linear-oblong, obtuse. Corolla-tube broad; lobes large, rounded, retuse at the tip. Capsule ovate-oblong, not seen quite ripe.

SOUTH ISLAND: Marlborough—Kaikoura Mountains, *Buchanan*! Nelson—Mount Buckland, *W. Townson*! Canterbury, Westland, and Otago—Not uncommon on the higher mountains of the dividing-range. STEWART ISLAND: Summit of Mount Anglem, *Kirk*! 3500–6500 ft. December–February.

This can hardly be described as erect, the leafy part of the stem being sometimes elongated and creeping. There seems to be two forms—one large and stout, very densely villous and with large flowers; the other smaller, with darker green leaves which are not so hairy, and with fewer smaller flowers.

5. *O. Cockayneana*, *Petrie in Trans. N.Z. Inst.* xxix. (1897) 426.—Forming large matted patches. Stems 3–6 in. long or more, branched, rather stout, creeping and rooting, glabrous or nearly so. Leaves in close-set opposite pairs, spreading and recurved, $\frac{3}{4}$ –1 $\frac{1}{4}$ in. long, ovate or ovate-spathulate, obtuse, suddenly narrowed into rather long sheathing petioles, crenate, bright-green above, often purplish below, coriaceous, glabrous or the margins of the petioles ciliate. Peduncles stout, erect, purplish, 3–6 in. high, 3–6-flowered, glabrous or nearly so. Bracts rather large, narrow obovate-spathulate, crenate, margins sometimes ciliate towards the base; pedicels slender, 1–1 $\frac{1}{2}$ in. long. Flowers large, $\frac{3}{4}$ –1 in. diam., white. Calyx $\frac{1}{3}$ in. long, 5-partite; segments oblong, obtuse. Corolla-tube broad, rather longer than the calyx; lobes broadly oblong, retuse. Ripe capsules not seen.

SOUTH ISLAND : Canterbury—Arthur's Pass and source of the Poulter River, *Cockayne* ! Westland—Source of the Otira, Kelly's Hill, Mount Alexander, *Cockayne* ! Otago—Cosmos Peaks, Lake Wakatipu, *H. J. Matthews* ! 3000–4500 ft. December–January.

Allied to *O. cæspitosa*, but distinguished by the larger size, much larger ovate-spathulate long-petioled leaves, and larger flowers.

6. *O. cæspitosa*, *Hook. f. Fl. Nov. Zel.* i. 198.—Forming broad matted patches. Stems often much branched, 2–6 in. long or more, creeping and rooting, stout or rather slender, leafy, glabrous or sparingly pilose or tomentose; branches short, ascending. Leaves close-set, spreading and recurved, usually distichous, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, obovate-spathulate, obtuse, narrowed into a short broad sheathing petiole or almost sessile, coriaceous or almost fleshy, bright-green, glabrous or the margins of the petioles ciliate, entire or more usually with 1–3 deep notches or crenatures. Peduncles strict, erect, 1–3 in. long, 1–5-flowered, glabrous, as are the bracts, pedicels, and calyces. Bracts 1 or 2 pairs, similar to the leaves; pedicels slender. Flowers $\frac{1}{2}$ – $\frac{2}{3}$ in. diam., white. Calyx $\frac{1}{4}$ in. long, 5-partite; segments oblong or linear-oblong, obtuse, often dilated at the tip. Corolla-tube broad, rather longer than the calyx; lobes broad, rounded. Capsule $\frac{1}{5}$ in. long, ovate-oblong.—*Handb. N.Z. Fl.* 219.

Var. *gracilis*, *Hook. f. l.c.* 738.—Much more slender. Leaves smaller, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Peduncles slender, 1–2-flowered; bracts small. Flowers smaller, $\frac{3}{8}$ – $\frac{1}{2}$ in. diam. Calyx-segments linear-oblong.

NORTH ISLAND : Summit of Mount Hikurangi, *Adams* and *Petrie* ! Ruahine Mountains, *Colenso* ! *Petrie* ! Tararua Mountains, *T. P. Arnold* ! *W. Townson* ! SOUTH ISLAND : Not uncommon in mountainous localities from Nelson to Otago. STEWART ISLAND : Summit of Mount Anglem, *Kirk* ! 3000–6500 ft. December–February.

A pretty little plant, easily recognised by the matted habit, small bright-green almost glabrous leaves, and glabrous peduncle, bracts, and calyces.

7. *O. prorepens*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 272.—Stems rather slender, branched, creeping and rooting, 2–4 in. long, glandular-hairy. Leaves close-set, spreading, distichous, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, obovate, rounded at the tip, narrowed into a broad thin petiole at the base, crenate, densely glandular-pilose above, almost glabrate with the veins conspicuous beneath. Peduncles erect, 2–4 in. high, sparingly glandular-pubescent, 3–6-flowered. Bracts 1 or 2 pairs, similar to the leaves, nearly glabrous; pedicels slender. Flowers large, $\frac{3}{4}$ in. diam., white. Calyx about $\frac{1}{4}$ in. long, 5-partite; segments oblong, obtuse, sparingly glandular-pubescent. Corolla-tube longer than the calyx; lobes broad, rounded. Ripe capsules not seen.

SOUTH ISLAND : Otago—Mount Bonpland, *Petrie* ! Mount Kyeburn, *H. J. Matthews* ! 4000–5000 ft.

A puzzling plant, agreeing in some of its characters with *O. sessilifolia*, *O. glandulosa*, and *O. cæspitosa*, but which cannot be satisfactorily placed with any of the three.

8. *O. glandulosa*, Hook. f. *Handb. N.Z. Fl.* 219.—Forming broad patches. Stems stout, branched, creeping and rooting, glabrous or nearly so, 2–6 in. long. Leaves close-set, imbricating, usually distichous, spreading or recurved, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, obovate-spathulate, rounded at the tip, gradually narrowed into a short broad petiole or sessile, entire or obscurely crenate, thick and coriaceous, margins densely ciliate with long jointed hairs, upper surface glandular-pilose towards the tip, under-surface glabrous, veined. Peduncles stout, erect, 1–3 in. long, 1–6-flowered, thickly covered with spreading glandular hairs, as are the bracts, pedicels, and calyces. Bracts 1 to 3 pairs, similar to the leaves; pedicels slender. Flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., white. Calyx $\frac{1}{4}$ – $\frac{1}{2}$ in. long, 5-partite; segments oblong, obtuse. Corolla-tube short and broad; lobes obovate, rounded at the tip. Capsule nearly $\frac{1}{2}$ in. long, ovoid, acute, equalling the calyx-segments.

SOUTH ISLAND: Otago—Mount Alta, *Buchanan*! Kurow Mountains, Dunstan Mountains, Mount Cardrona, Mount St. Bathan's, *Petrie*! 3500–6000 ft. November–January.

9. *EUPHRASIA*, Linn.

Annual or perennial herbs, more or less parasitic. Leaves opposite, toothed or lacinate or palmately 3–5-fid, on the flowering branches often insensibly passing into leafy bracts. Flowers in terminal spikes or racemes, or few towards the tips of the branches. Calyx tubular or campanulate, 4-lobed; lobes equal or connate in pairs. Corolla-tube narrow below, dilated above; limb 2-lipped; upper lip erect, concave, 2-lobed; lower lip 3-lobed. Stamens 4, didynamous, converging beneath the upper lip; anther-cells distinct, parallel, equally or unequally mucronate at the base. Style pilose; stigma capitate. Capsule oblong or oblong-orbicular, compressed, loculicidally dehiscent. Seeds usually numerous, pendulous, oblong, longitudinally grooved.

A genus found in the temperate regions of both hemispheres. The species are extremely variable and difficult to characterize, and are variously estimated at from 20 to 80, according to the different views of authors. I have to express my indebtedness to Dr. R. von Wettstein's elaborate monograph for much information respecting the New Zealand forms, all of which are endemic.

* Ovary with several ovules* in each cell.

Perennial, erect, 6–30 in. high, much branched. Leaves narrowed into a distinct petiole, margins flat. Flowers numerous, large, $\frac{1}{2}$ – $\frac{3}{4}$ in. long 1. *E. cuneata*.
 Perennial, usually erect, 3–8 in. high, sparingly branched. Leaves close-set, not narrowed into a distinct petiole, margins recurved. Flowers large, $\frac{1}{2}$ – $\frac{3}{4}$ in. long 2. *E. Monroi*.

- Annual, or the rootstock alone perennial, erect or decumbent, slender, 1-4 in. high. Leaves distant, sessile, margins recurved. Flowers large, $\frac{1}{2}$ - $\frac{3}{4}$ in. long .. 3. *E. revoluta*.
 Annual, erect, sparingly branched, 1-4 in. high. Leaves remote, ovate, toothed. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. long, yellow .. 4. *E. Cockayneana*.
 Annual, erect or decumbent, much or sparingly branched, 1-4 in. high. Leaves remote, ovate, toothed. Flowers $\frac{1}{4}$ - $\frac{1}{2}$ in. long, white 5. *E. zealandica*.

** Ovary with only 2 ovules in each cell.

- Annual, slender, much branched from the base, 1-3 in. high. Leaves with 2-4 obtuse teeth. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. long; peduncles long, slender 6. *E. Cheesemanii*.
 Annual, branched from the base, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. high; branches weak, not rooting. Leaves deeply 5-lobed. Flowers $\frac{1}{4}$ in. long, almost sessile, tube of corolla short 7. *E. Dyeri*.
 Perennial, very slender, creeping and rooting, 1-4 in. long. Leaves remote, minute, deeply 3-lobed. Flowers axillary, peduncled, $\frac{1}{3}$ - $\frac{1}{2}$ in. long; tube of corolla long .. 8. *E. repens*.

1. *E. cuneata*, Forst. Prodr. n. 234.—Perennial, 6-30 in. high or even more; stems erect or decumbent, firm, sometimes almost woody at the base, usually much branched and often excessively so, rarely simple; branches slender, virgate, leafy, puberulous or rarely almost glabrous. Leaves variable in size and shape, $\frac{1}{5}$ - $\frac{2}{3}$ in. long, broad or narrow obovate-cuneate, rounded at the tip, narrowed at the base into a distinct petiole of variable length, coriaceous, glabrous, with 1-3 more or less distinct notches on each side, rarely entire; margins flat, not recurved. Flowers usually very numerous, in large specimens from the repeated branching of the flowering stems and the reduction of the upper leaves to bracts forming a quasi-paniculate inflorescence, in smaller forms spicate; peduncles shorter than the calyx. Calyx small, narrow, 4-lobed; lobes obtuse, shorter than the tube. Corolla large, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, white with a yellow eye, sometimes with purplish streaks, pilose externally; upper lip 2-lobed, lobes emarginate; lower lip 3-lobed. Capsule linear-cuneate, emarginate, hairy or at length glabrous, exceeding the calyx. Seeds numerous, elongate.—*A. Rich. Fl. Nouv. Zel.* 191; *A. Cunn. Precur.* n. 384; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 199; *Handb. N.Z. Fl.* 219; *Wettst. Monog. Euphr.* 247, t. v. f. 369-374, and t. xiv. f. 1. *E. tricolor*, *Col. in Trans. N.Z. Inst.* xix. (1887) 264.

NORTH ISLAND: From the East Cape and Taupo southwards to Cook Strait, not uncommon. SOUTH ISLAND: Has been recorded from several stations from Nelson to Otago, but I have seen no specimens which I can refer to it. Sea-level to 4500 ft. December-March.

A distinct species, well marked by the large size, much-branched perennial habit, cuneate leaves narrowed into a distinct petiole, large pedicelled flowers, and long narrow capsule. There seems to be two main varieties—one tall and slender, with numerous leafy branches, narrow long-petioled leaves, and copious inflorescence; the other, which is principally montane or subalpine, and which

corresponds to Colenso's *E. tricolor*, is not so much branched, the leaves are shorter and broader, on shorter petioles, and the flowers are spicate along the upper part of the branches. It might be distinguished as var. *tricolor*.

2. *E. Monroi*, *Hook. f. Handb. N.Z. Fl.* 220.—Perennial, sometimes woody at the very base; stems erect or decumbent below, 3–8 in. high, leafy above, sparingly branched, faintly bifariously pubescent. Leaves rather close-set, spreading, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, obovate or obovate-spathulate, obtuse, narrowed to the base but not evidently petiolate, coriaceous, glabrous, furnished with one or two short obtuse teeth on each side, margins thick, recurved. Flowers in short few-flowered leafy spikes towards the ends of the branches, sessile or very shortly peduncled; bracts similar to the leaves. Calyx 4-lobed; lobes short, thick, obtuse or subacute, margins recurved. Corolla $\frac{1}{2}$ – $\frac{2}{3}$ in. long; tube funnel-shaped, exceeding the calyx; upper lip bilobed, lower lip trilobed; lobes retuse. Capsule obovate, retuse, equalling the calyx or slightly longer than it.—*Wettst. Monog. Euphr.* 248, t. v. f. 375–382, and t. xiv. f. 2.

SOUTH ISLAND: Not uncommon on the mountains of Nelson and Marlborough. Canterbury—Hurunui Mountains, *Travers*; Southern Alps, *Sinclair* and *Haast* (Handbook). 3000–5000 ft. December–March.

Very closely allied to *E. cuneata*, but a smaller much more sparingly branched plant, with close-set uniform leaves not obviously petiolate and with the margins recurved. It is also without the copious branched inflorescence of the typical state of *E. cuneata*, the flowers being few towards the tips of the branches. It should be mentioned that in both *E. cuneata* and *E. Monroi* it is only a part of the plant which is perennial, the flower-bearing branchlets perishing during winter, their places being taken by new shoots produced during the following season.

3. *E. revoluta*, *Hook. f. Fl. Nov. Zel.* i. 199.—Annual, or sometimes the rootstock perennial. Stems 1–4 in. high, very slender, much or sparingly branched from the base, often creeping and putting up few or many ascending branchlets, more or less glandular-pubescent. Leaves in rather distant pairs, sessile, very variable in size, the lowest usually the smallest, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, obovate-cuneate, obtuse or subacute, narrowed to the base, furnished with 1–3 teeth on each side, glandular-pubescent or glabrous, margins revolute. Flowers few towards the tips of the branches, large, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam.; peduncles shorter or longer than the leaves. Calyx shortly 4-lobed; lobes triangular, acute, much shorter than the tube. Corolla-tube funnel-shaped, exceeding the calyx; limb spreading; upper lip 2-lobed; lower lip 3-lobed, lobes deeply emarginate. Capsule oblong, obtuse; seeds numerous in each cell.—*Handb. N.Z. Fl.* 220; *Wettst. Monog. Euphr.* 266, t. xiv. f. 8.

NORTH ISLAND: Mount Hikurangi, *S. Dodgshun*; Ruahine Mountains, *Colenso*! *H. Hill*! *Petrie*! Ruapehu, *H. Hill*! SOUTH ISLAND: Not uncommon in mountain districts throughout. 2500–5500 ft. December–March.

An exceedingly variable plant, best distinguished from the two following by the different habit, much larger flowers and usually longer peduncles.

4. **E. Cockayniana**, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 269.—Annual. Stems slender, erect, 2–5 in. high, sparingly branched from the base; branches ascending, more or less clothed with short crisp glandular pubescence. Leaves in remote opposite pairs, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, ovate or rhomboid-ovate, subacute, cuneate at the base, furnished with 2–3 rather large teeth on each side, both surfaces more or less glandular-pubescent, margins reflexed. Flowers few towards the tips of the branches, sessile or very shortly peduncled, nearly $\frac{1}{2}$ in. long, bright-yellow. Calyx oblong-campanulate, 4-lobed to the middle, lobes subacute. Corolla-tube longer than the calyx; upper lip 2-lobed, lobes entire; lower lip 3-lobed, lobes emarginate. Capsule broadly oblong, included in the enlarged calyx, glabrous or nearly so.—E. Berggreni, *Wettst. Monog. Euphr.* 265, f. 4, 5.

SOUTH ISLAND: Canterbury and Westland—Arthur's Pass, *Berggren*, *Kirk*! *Cockayne*! *T. F. C.*; Kelly's Hill, *Petrie*! 3000–4500 ft. December–March.

The only species yet recognised in New Zealand with the flowers wholly yellow. Except in the colour of the flowers and in the larger corolla it hardly differs from some states of *E. zealandica*.

5. **E. zealandica**, *Wettst. Monog. Euphr.* 264, t. vi. f. 430–435, and t. xiv. f. 10.—Annual. Stems slender, erect, 1–4 in. high, much or sparingly branched from the base, or in depauperated specimens simple, more or less bifariously pubescent with short crisp white hairs; branches spreading or ascending, sometimes prostrate. Leaves in distant opposite pairs, sessile, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, ovate, obtuse or subacute, cuneate at the base, furnished with 2–4 rather large teeth on each side, both surfaces glandular-pubescent, margins reflexed. Flowers few towards the tips of the branches, sessile or very shortly pedicelled, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, white; peduncles elongating in fruit. Calyx oblong-campanulate, 4-lobed; lobes usually shorter than the tube. Corolla-tube scarcely longer than the calyx; upper lip short, arched, 2-lobed; lower lip 3-lobed; all the lobes entire. Capsule broad, almost orbicular, scarcely exceeding the enlarged calyx; seeds several in each cell.—*E. antarctica*, *Hook. f. Fl. Nov. Zel.* i. 199; *Handb. N.Z. Fl.* 220 (not of *Benth.*). *E. pygmæa*, *Col. in Trans. N.Z. Inst.* xxxi. (1889) 279.

NORTH ISLAND: Ruahine Mountains, *Colenso*! *Tryon*! *Olsen*! Upper Wairarapa, *Buchanan*. SOUTH ISLAND: Not uncommon in mountain districts throughout. 2000–6000 ft. December–March.

Distinguished from *E. revoluta* by the different habit, much more conspicuously toothed leaves, and much smaller flowers; from *E. Cockayniana* by

the smaller flowers, which are never altogether yellow; and from *E. Cheesemanii* by the almost sessile flowers, shorter and narrower corolla, and especially by the numerous ovules.

6. *E. Cheesemanii*, *Wettst. in Osterr. Bot. Zeit.* (1900) 381, f. 1-5.—A slender annual herb $1\frac{1}{2}$ – $2\frac{1}{2}$ in. high, much branched from the base; branches spreading or ascending, minutely pubescent. Leaves small, sessile, shorter than the internodes, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, ovate or obovate-cuneate, obtuse, more or less clothed with short crisp glandular pubescence, margins with 2–4 obtuse teeth on each side. Flowers axillary towards the tips of the branches, rather remote, large for the size of the plant, $\frac{1}{3}$ – $\frac{1}{2}$ in. long; peduncles long, slender, $\frac{1}{3}$ – $\frac{3}{4}$ in. long. Calyx campanulate, shortly 4-lobed; lobes obtuse, sparsely glandular-pubescent. Corolla broadly funnel-shaped; tube much longer than the calyx; upper lip short, 2-lobed; lower lip 3-lobed; lobes obtuse. Ovary pubescent, with 2 superposed ovules in each cell. Capsule obovate, compressed, slightly longer than the calyx.

SOUTH ISLAND: Nelson—Mount Arthur Plateau and Mount Owen, T. F. C.; Mount Mantell and Brunner Range, W. Townson! 3500–5000 ft. December–February.

This has much of the appearance of *E. zealandica*, but can be distinguished by the longer peduncles, fruiting-calyx not conspicuously enlarged, longer and narrower corolla, and by the ovary having only 2 ovules in each cell.

7. *E. Dyeri*, *Wettst. Monog. Euphr.* 267, f. 6, 7.—A minute delicate annual herb $\frac{1}{2}$ – $1\frac{1}{2}$ in. high, branched from the base; branches weak, spreading, not rooting. Leaves in opposite pairs, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, broadly obovate in outline or broader than long, deeply 5-lobed or more rarely 3-lobed; lobes flat, erect, acute, minutely setulose on the margins. Flowers axillary, solitary, $\frac{1}{4}$ in. long; peduncles usually short but sometimes equalling the leaves. Calyx campanulate, 4-lobed half-way down; lobes flat, acute, minutely setulose. Corolla-tube longer than the calyx, sometimes $\frac{2}{3}$ as long again, curved below; limb with the upper lip short, broad, concave, shortly 2-lobed; lower lip 3-lobed. Anthers cohering. Ovary pubescent; ovules 2 in each cell, pendulous. Capsule obovate-oblong, compressed, shorter than the calyx.

SOUTH ISLAND: Otago—Mount Kyeburn, Mount Buster, *Petrie!* summit of Maungatua, B. C. Aston! STEWART ISLAND: Near Port Pegasus, *Kirk!* 500–4500 ft.

8. *E. repens*, *Hook. f. Fl. Nov. Zel.* i. 200.—A minute very slender creeping and rooting glabrous or puberulous herb; branches prostrate, almost filiform, 1–4 in. long, rooting at the nodes. Leaves minute, in rather remote pairs, sessile, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, cuneate, deeply 3-lobed; lobes flat, acute, erect. Flowers axillary and solitary, erect, large for the size of the plant, $\frac{1}{8}$ – $\frac{1}{2}$ in.

long; peduncles slender, exceeding the leaves, sometimes $\frac{1}{2}$ in. long. Calyx 4-lobed to about $\frac{1}{2}$ -way down; lobes flat, erect, acute. Corolla-tube slender, curved, more than twice as long as the calyx; upper lip short, broad, shortly 2-lobed; lower lip 3-lobed. Anthers glabrous or nearly so. Ovary pubescent; ovules 2 in each cell, pendulous. Ripe capsules not seen.—*Handb. N.Z. Fl.* 221; *Wettst. Monog. Euphr.* 253.

SOUTH ISLAND: Otago—Bluff Island, *Lyall*; mouth of the Oreti River, *Kirk*!

A very remarkable little plant, distinguished from the preceding by the creeping and rooting habit, smaller remote 3-lobed leaves, longer and narrower flowers on longer peduncles, and shorter calyx-lobes.

10. ANAGOSPERMA, Wettst.

A small creeping intricately branched herb. Leaves opposite, entire or 3-lobed. Flowers solitary and axillary, erect, shortly peduncled. Calyx oblong-campanulate, 5-lobed to the middle; lobes equal, ovate-lanceolate, acute. Corolla-tube excessively long and slender, 1–2 in. long, narrow at the base, gradually expanded above; limb short, 2-lipped; upper lip erect, obcordate, shortly 2-lobed; lower lip rather shorter, spreading or deflexed, 3-lobed. Stamens 4, didynamous; anthers large, almost as long as the lower lip of the corolla, mucronate at the base. Ovary small, broadly ovoid, 2-celled; ovules solitary, pendulous from the top of the cell. Style slender; stigma circinate incurved. Capsule broadly obcuneate, much broader than long, loculicidally dehiscent, compressed. Seeds one in each cell, large, oblong, pendulous.

A very remarkable monotypic genus, confined to New Zealand. It is closely allied to *Euphrasia*, but differs in the extraordinary length of the corolla-tube, in the solitary ovules, and in the broad obcuneate capsule.

1. *A. dispermum*, *Wettst. in Deutsch. Bot. Ges.* xiii (1895) 242. —Stems very slender, weak, procumbent and matted, 2–4 in. long, sparsely glandular-pubescent. Leaves in rather remote pairs, sessile or nearly so, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, ovate-lanceolate, acuminate, narrowed to the base, entire or deeply 3-lobed, 3-nerved, glabrous or glandular-pubescent. Flowers on short curved peduncles, erect. Corolla about $\frac{1}{2}$ – $\frac{3}{4}$ in. long when first expanded, but elongating as the flowering advances and often becoming 2 in. long, very many times longer than the small calyx. Capsule $\frac{1}{10}$ – $\frac{1}{8}$ in. long, very much broader than long.—*Euphrasia longiflora*, *Kirk in Trans. N.Z. Inst.* xi. (1879) 440, not of *Vahl*. *E. (Anagospërma) disperma*, *Hook. f. Ic. Plant.* t. 1283; *Kirk, l.c.* xii. (1880) 396, t. 14.

SOUTH ISLAND: Nelson—Mount Rochfort and other mountains near Westport, *Rev. F. H. Spencer*! *Dr. Gaze*! *W. Townson*! Westland—Paparoa Range, *R. Helms*! Ahaura Plain, Lake Brunner, Teremakau Paddock, *Kirk*! Okarito, *A. Hamilton*! 250–3500 ft. January–March.

11. **SIPHONIDIUM**, Armstr.

"Leaves opposite. Flowers hermaphrodite. Calyx campanulate, deeply 4-toothed, much wrinkled when dry; teeth with narrow acuminate points. Corolla funnel-shaped with an exceedingly slender curved tube 3 in. long, dilated upwards, swollen or slightly spurred about three-fourths of the way up at the commencement of the broadest part; throat campanulate; limb 2-lipped, upper lip of one narrow erect or suberect concave lobe; lower lip of three nearly equal spreading rounded lobes, throat not tumid but having a few scattered hairs. Stamens 4, didynamous, inserted on the throat, included, the two lower the longest. Anthers 2-celled, introrse. Style extremely slender, a little longer than the stamens, with a 2-lobed stigma. Ovary superior. Capsule 2-celled, loculicidal, included within the calyx. Seeds minute (capsule immature)."

1. **S. longiflorum**, Armstr. in *Trans. N.Z. Inst.* xiii. (1881) 341.—"A small creeping or trailing herb. Branches clothed with scattered spreading hairs. Leaves opposite, $\frac{1}{4}$ in. long, entire, linear-lanceolate, rarely ovate, acuminate, obscurely 3-nerved, pubescent or glabrous, shortly petiolate. Flowers solitary, axillary, very shortly peduncled, not bracteate. Corolla pubescent, pale-blue(?) with darker veins."

SOUTH ISLAND: Karamea, west coast of Nelson, *Rev F. H. Spencer*.

This is unknown to me, and in the absence of further information I have reproduced Mr. Armstrong's original description. It agrees in so many points with the characters of *Anagosperra* that the suspicion arises that the two plants may prove identical. But if Mr. Armstrong's description is correct it differs in the longer corolla-tube, the entire upper lip, and 2-lobed stigma. Mr. Armstrong does not mention the number of ovules.

ORDER LV. **LENTIBULARIÆ.**

Herbs, either aquatic or growing in wet soil. Leaves in the terrestrial species radical, few or rosulate, entire; in the aquatic species more or less scattered, capillary and multifid. Flowers irregular, hermaphrodite, either solitary or several on a scapiform peduncle. Calyx inferior, 2-lipped or 4-5-partite. Corolla gamopetalous, hypogynous, irregular, the tube usually produced into a spur or pouch, the limb 2-lipped, upper lip entire or 2-lobed, lower lip 3-5-lobed. Stamens 2, inserted at the base of the corolla-tube; filaments usually broad, arched; anthers 1-celled. Ovary superior, globose, 1-celled; style short and thick; stigma 2-lobed; ovules numerous, on a free central placenta. Fruit a capsule, either bursting irregularly or 2-4-valved. Seeds numerous, small; albumen wanting; embryo either undivided or with very short cotyledons.

A small but very distinct order, comprising 4 genera and about 250 species. It is remarkable on account of the roots or leaves often being provided with small bladder-like appendages, which catch minute aquatic animals. The single genus found in New Zealand is almost world-wide in its distribution.

1. UTRICULARIA, Linn.

Slender herbs, floating or terrestrial. Leaves of the terrestrial species all radical, inconspicuous or fugacious; of the floating species scattered, multifid with capillary segments, furnished with floating bladders. Peduncles or scapes radical or axillary, either 1-flowered or bearing a few- or many-flowered raceme or spike. Calyx 2-partite; segments entire or nearly so, often enlarged in fruit. Corolla spurred at the base, 2-lipped; upper lip erect, entire or 2-lobed; lower lip larger, spreading, 3-6-lobed, with a palate projecting into the throat and almost closing the flower. Stamens 2; filaments incurved. Style short; stigma unequally 2-lobed. Capsule globose or nearly so, 2-valved or bursting irregularly. Seeds many.

A large genus of world-wide distribution, the species probably numbering close upon 200. With the exception of *U. monanthos*, which extends to Tasmania, all the New Zealand species are endemic. They are also very imperfectly known, and require a careful study from fresh specimens.

A. Stems floating. Leaves submerged, multifid; segments capillary.

Stems often several feet in length; branches with the	
leaves on $1\frac{1}{2}$ -3 in. across	1. <i>U. protrusa</i> .
Stems 2-6 in. long; branches with the leaves on $\frac{1}{2}$ in.	
across	2. <i>U. Mairii</i> .

B. Plants stemless, growing in bogs or wet soil. Leaves all radical, few, small, narrow-linear, entire.

Flowers pale-purple. Upper lip of corolla not 2-lobed;	
lamina of lower lip broad, entire; spur short, obtuse ..	3. <i>U. novæ-zealandicæ</i> .

Flowers white. Upper lip of corolla 2-lobed; lamina of	
lower lip broad, entire; spur long, acute, minutely	
2-horned at the tip	4. <i>U. delicatula</i> .

Upper lip of corolla 2-lobed; lamina of lower lip 3-lobed	5. <i>U. Colensoi</i> .
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Flowers dark violet-purple. Upper lip of corolla cuneate,	
retuse; lamina of lower lip very broad; spur short ..	6. <i>U. monanthos</i> .

1. *U. protrusa*, Hook. f. *Fl. Nov. Zel.* i. 206.—Stems floating in still water, branched, often extending to a length of several feet, slender, filiform. Leaves numerous, all submerged, spreading, pinnately multipartite; segments many, filiform; bladders numerous, about $\frac{1}{8}$ in. long, obliquely ovoid, shortly pedicelled, attached near the base of the segments. "Scape stout, erect, 2-4-flowered. Sepals oblong. Corolla yellow; upper lip 3-lobed; lower broader, subquadrate, its disc protruded, margins recurved. Spur short, obtuse."—*Handb. N.Z. Fl.* 222.

NORTH ISLAND: Auckland—Lake Tongonge, near Ahipara, *R. H. Matthews* ! Lake Waihi, Waikato, *Kirk* ! *T. F. C.* ; Bay of Plenty, *Colenso*.

I have taken the description of the inflorescence, &c., from the Handbook, the plant occurring in Lakes Waihi and Tongonge not being known in a flowering state. It may not be identical with Hooker's *U. protrusa*, the type specimens of which have been unfortunately lost.

2. *U. Mairii*, *Cheesem. n. sp.*—Stems floating in still water, sparingly branched, 2–6 in. long, stouter than in the preceding species. Leaves numerous, all submerged, spreading, about $\frac{1}{4}$ in. long, pinnately divided into numerous capillary segments; segments broader than in *U. protrusa*; bladders numerous, about $\frac{1}{10}$ in. long, attached to the segments. Flowers not seen.

NORTH ISLAND: Auckland—Lake Rotomahana, *Kirk* and *Captain G. Mair* ! (1872).

This is certainly distinct from the Lake Waihi and Lake Tongonge plant, which has stems several feet in length, and the branches of which, with the spreading leaves, are from $1\frac{1}{2}$ –3 in. across. In *U. Mairii* the stems are much shorter and stouter, and the branches with the leaves on are only about $\frac{1}{2}$ in. across. Which of the two plants corresponds to Hooker's *U. protrusa* can only be determined when flowering specimens are obtained. *U. Mairii* was destroyed in the Rotomahana locality by the eruption of 1886, but it probably occurs in some of the lakes in the Rotorua district.

3. *U. novæ-zealandiæ*, *Hook. f. Fl. Nov. Zel. i. 206.*—Stemless. Roots slender, creeping, bearing numerous shortly pedicelled bladders about $\frac{1}{8}$ in. diam. when fully grown. Leaves 1–3, all radical, often disappearing at the time of flowering, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, rarely more, very narrow-linear or linear-spathulate, quite entire, rather fleshy, 1-nerved. Scape or peduncle very slender, variable in length, 3–9 in. high or more, simple, erect, 1–4-flowered; bracts small, opposite or in threes. Flowers shortly pedicelled, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, pale-purple with a yellow eye. Upper calyx-segment orbicular or nearly so, rounded or slightly retuse at the tip; lower rather smaller, concave, 2-lobed. Upper lip of the corolla much the smaller, narrow cuneate-oblong, constricted below the middle, truncate or nearly so at the tip; lower lip with a broad horizontal almost semicircular lamina about $\frac{1}{2}$ in. diam., margin entire; palate with three raised ridges, each with a central groove; spur short, broad, obtuse. Capsule membranous, globose, $\frac{1}{8}$ in. diam. — *Handb. N.Z. Fl. 222*. *U. subsimilis*, *Col. in Trans. N.Z. Inst. xvi. (1884) 334*.

NORTH ISLAND: Auckland—Lake Ohia (near Mongonui), *T. F. C.* ; Great Barrier Island, *Kirk* ! near Helensville, *W. T. Ball* ! near Waiuku, *H. Carse* ! Waihi, *Petrie* ! Lake Taupo, *A. Hamilton* ! Taranaki—Ngairangi Swamp, *T. F. C.* Wellington—Palliser Bay, *Colenso*. **SOUTH ISLAND:** Canterbury Plains, *Armstrong*. November–January.

Probably not uncommon in peaty swamps throughout the North Island, but easily overlooked.

4. *U. delicatula*, *Cheesem. n. sp.*—Habit of *U. novæ-zealandiæ*, but much smaller, the scape seldom more than 3 in. high. Leaves 1 or 2 or wanting, narrow-linear or narrow linear-spathulate, quite entire. Scape 1-3 in. high, slender, wiry, erect, 1-3-flowered; bracts very small. Flowers shortly pedicelled, about $\frac{1}{5}$ in. long, white with a faint yellow eye. Calyx-segments almost equal, sub-orbicular, concave. Upper lip of corolla the smaller, linear-oblong, two-lobed at the tip; lower lip with a horizontally spreading lamina which is quite entire, not 3-lobed; palate very obscurely thickened or quite plane; spur longer than in *U. novæ-zealandiæ*, minutely 2-horned at the tip. Capsule globose, membranous, about $\frac{1}{5}$ in. diam.

NORTH ISLAND: Auckland—Near Kaitaia, *T. F. C.*; near Waiuku, *H. Carse!* swamps near Ohaupo (Waikato), *T. F. C.* November-January.

This differs from *U. novæ-zealandiæ* in the smaller size, in the upper lip of the corolla being 2-lobed, and in the longer spur, which is minutely 2-horned at the tip. From *U. Colensoi* it is at once separated by the entire lower lip.

5. *U. Colensoi*, *Hook. f. Fl. Nov. Zel. i. 206.*—"Altogether like *U. novæ-zealandiæ* but with the upper lip of the corolla linear-oblong, 2-lobed; lower broadly cuneate, 3-lobed, middle lobe retuse, disc with 3 gibbous prominences."—*Handb. N.Z. Fl. 223.* (?) *U. vulcanica*, *Col. in Trans. N.Z. Inst. xxvi. (1894) 318.*

NORTH ISLAND: East Coast, *Colenso* (Handbook).

This does not seem to have been collected since its first discovery more than fifty years ago, unless *Colenso's U. vulcanica* be the same species. Mr. Colenso describes his plant as having a 3-lobed lower lip, but he also states that the upper lip is "subovate, obtuse," which is at variance with Hooker's description. Unfortunately, the type specimens of both species have been lost, so that no comparison can now be made.

6. *U. monanthos*, *Hook. f. Fl. Tasm. i. 299.*—A minute stemless herb. Roots or rhizome very slender, bearing several subglobose compressed bladders $\frac{1}{15}$ – $\frac{1}{10}$ in. diam. Leaves few, all radical, $\frac{1}{4}$ –1 in. long, narrow linear-spathulate, petiolate, quite entire. Scape slender, simple, erect, $\frac{3}{4}$ –4 in. high, 1- or rarely 2-flowered. Flowers large for the size of the plant, $\frac{1}{3}$ in. diam. or more, dark violet-purple with a yellow eye. Calyx-segments oblong, obtuse. Upper lip of corolla much the smaller, broadly cuneate, retuse; lower lip expanded into a broad semicircular horizontally spreading lamina; palate glandular; spur short, obtuse. Capsule globose, membranous.—*Handb. N.Z. Fl. 222.*

NORTH ISLAND: Rangipo Plain, near Ruapehu, *Petrie!* SOUTH ISLAND, STEWART ISLAND: Not uncommon in peat-bogs in mountainous localities. Sea-level to 3500 ft. December-March.

Easily recognised by the large dark-purple flowers. For a description of the bladders, and for some notes on the fertilisation, see Mr. G. M. Thomson's paper on the fertilisation of New Zealand flowering-plants (*Trans. N.Z. Inst. xiii. 278*).

ORDER LVI. GESNERACEÆ.

Herbs or shrubs. Leaves generally opposite or whorled, simple, entire or toothed; stipules wanting. Flowers usually irregular, hermaphrodite, in axillary or terminal racemes or cymes, or solitary. Calyx inferior or semi-superior, 5-partite; segments valvate. Corolla gamopetalous, usually irregular; tube long or short; limb more or less oblique, lobes 4-5, imbricate. Stamens 2 or 4, inserted on the tube of the corolla; anthers 2-celled. Ovary superior or more rarely inferior, 1-celled; style linear; stigma capitate or 2-lobed; ovules many, anatropous, on two opposite entire or bifid parietal placentas. Fruit capsular or berried, dehiscent or indehiscent. Seeds numerous, small; albumen present or absent; embryo straight.

A tolerably large order, almost wholly confined to tropical regions. Genera 70; species under 800. The order includes many handsome greenhouse plants, especially of the genera *Gloxinia* and *Achimenes*, but otherwise its economic properties are unimportant. The single New Zealand genus is endemic.

1. RHABDOTHAMNUS, A. Cunn.

A much-branched shrub; branches spreading, scabrid-pubescent. Leaves opposite. Flowers solitary, axillary. Calyx free, deeply 5-fid; lobes lanceolate, acuminate. Corolla-tube sub-campanulate; limb obscurely 2-lipped; lobes 5, rounded, spreading, nearly equal. Stamens 4 with the rudiment of a fifth, inserted on the corolla-tube below the middle; filaments long, linear, arched; anthers cohering at the apex in a cruciate manner; cells distinct, parallel. Disc small, obscure, annular. Ovary superior, ovoid; style filiform; stigma 2-lobed; ovules numerous, on thick and prominent 2-lobed placentas. Capsule ovoid, acuminate, coriaceous, 2-valved; valves 2-fid, separating from the placentas. Seeds numerous, minute, ovoid.

A monotypic genus confined to the North Island of New Zealand. It is closely allied to the New Caledonian *Coronanthera* and the Lord Howe Island *Negria*.

1. **R. Solandri**, A. Cunn. *Precur.* n. 385. — Slender, much branched, 2-5 ft. high; branches opposite, terete, everywhere rough with short stiff greyish pubescence. Leaves on slender petioles; blade variable in size, usually $\frac{1}{2}$ -1 in. long, but sometimes over 2 in., broadly ovate or orbicular, coarsely toothed, both surfaces rough with short scabrid hairs, dull-green. Flowers handsome, $\frac{3}{4}$ -1 in. long, orange with red stripes; peduncles slender, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long. Capsule $\frac{1}{4}$ - $\frac{1}{3}$ in. long, included within the persistent calyx. — *Raoul, Choix*, 44; *Hook. f. Fl. Nov. Zel.* i. 186; *Handb. N.Z. Fl.* 221; *C. B. Clarke in D.C. Monog. Phan.* v. 166, t. 17. *R. scabrosus*, *Steud. Nom.* ed 2, ii. 443. *Columnea scabrosa*, *Sol. ex D.C. Prodr.* ix. 277.

NORTH ISLAND: Lowland districts from the North Cape southwards to Wellington, but rare and local to the south of the Auckland Province. Sea-level to 2000 ft. *Waiuata*; *Matata*. Flowers most of the year.

For an account of the fertilisation, see a paper by Mr. Petrie in Trans. N.Z. Inst. vol. xxxv. p. 321.

ORDER LVII. MYOPORINEÆ.

Shrubs or trees. Leaves alternate or scattered, rarely opposite, simple, entire or toothed; stipules wanting. Flowers hermaphrodite, irregular or almost regular. Calyx inferior, persistent, 5-partite or 5-fid. Corolla gamopetalous, hypogynous, 5-lobed; lobes imbricate. Stamens 4, didynamous, rarely 5-6, inserted at the base of the corolla-tube; anthers introrse, cells confluent. Ovary superior, not lobed, normally 2-celled with 2 (rarely more) pendulous ovules in each cell, but sometimes the cells are more or less completely divided into 2, with a single ovule in each cell, or very rarely the cells may be as many as 5-10; style terminal; stigma small, entire or emarginate. Fruit drupaceous, indehiscent, succulent or almost dry, 2-4-celled, rarely more-celled. Seeds solitary in each cell; albumen scanty, fleshy; embryo straight; radicle superior, next the hilum.

A small order, almost confined to Australia, a few species only being found in the Pacific islands, the Malay Archipelago, and South Africa, and one monotypic genus in the West Indies. Genera 5; species about 90. The properties of the order are unimportant.

1. MYOPORUM Banks and Sol.

Shrubs or small trees, glabrous or the branchlets glutinous. Leaves alternate, entire or serrate, studded with pellucid glands. Flowers small, axillary, solitary or fascicled. Calyx 5-lobed or -partite, not enlarged after flowering. Corolla campanulate; tube short; limb 5-lobed, lobes subequal or the lowest rather larger. Stamens 4, rarely 5 or 6, nearly equal, included or shortly exserted. Ovary ovoid, 2-4-celled, very rarely 5-10-celled, with 1 ovule in each cell, rarely 2-celled with 2 ovules in each cell. Drupe ovoid or subglobose, more or less succulent.

A genus of about 25 species, mostly Australian, the rest scattered through the Pacific islands, the Malay Archipelago, China and Japan, and Mauritius. The single New Zealand species is endemic, but is very closely allied to some from the Pacific islands.

1. *M. lætum*, *Forst. Prodr.* n. 238.—A shrub or small tree 8-25 ft. high; trunk 9-18 in. diam.; bark brown, thick and furrowed; branches spreading, viscid at the tips. Leaves $1\frac{1}{2}$ -4 in. long, lanceolate to oblong-lanceolate or obovate, acute or acuminate, narrowed into petioles $\frac{1}{2}$ -1 in. long, serrulate above the middle, bright-green, quite glabrous, almost fleshy, veins inconspicuous. Flowers in axillary fascicles of 2-6, small, about $\frac{1}{2}$ in. diam., white

spotted with purple; peduncles $\frac{1}{3}$ – $\frac{2}{3}$ in. long. Calyx-segments lanceolate, acuminate. Corolla campanulate; lobes rounded, villous within. Stamens 4, scarcely exserted. Ovary 4-celled. Drupe $\frac{1}{4}$ – $\frac{1}{3}$ in. long, oblong, succulent, reddish-purple.—*A. Rich. Fl. Nouv. Zel.* 195; *A. Cunn. Precur.* n. 387; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 204; *Handb. N.Z. Fl.* 225; *Kirk, Forest Fl.* t. 124. *Citharexylum perforatum*, *Forst. Prodr.* sub. n. 238.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Not uncommon in lowland districts as far south as Otago, chiefly near the coast. *Ngaio*. October–January.

The wood is said to be durable, and is sometimes used for cabinetwork; and an infusion of the leaves has been used as a wash to prevent the bites of mosquitoes.

ORDER LVIII. VERBENACEÆ.

Herbs or shrubs or trees. Leaves opposite or whorled, very rarely alternate, usually simple (digitate in *Vitex*); stipules wanting. Flowers generally hermaphrodite, irregular or rarely regular. Calyx inferior, persistent, 4–5-toothed. Corolla gamopetalous, hypogynous; limb 2-lipped or equal, 4–5-lobed, lobes imbricate. Stamens usually 4, didynamous, inserted on the tube of the corolla; anthers 2-celled, dehiscing lengthwise. Ovary superior, entire or shortly 4-lobed, 2–4-celled; style terminal, simple; stigma entire or 2-lobed; ovules solitary or 2 collateral in each cell, erect or ascending. Fruit drupaceous or almost capsular, 2–4-celled (1-celled in *Avicennia*), indehiscent or the whole fruit or the endocarp alone separating into 2–4 pyrenes. Seeds solitary in each cell, usually erect or ascending; albumen present or wanting; embryo straight, radicle inferior.

A moderately large order, most abundant in the tropics or warm temperate regions of both hemispheres; a few species extend both north and south into cool climates. Genera 60 or thereabouts; species estimated at 700. Bitter or astringent properties predominate in the order, but these can hardly be said to be of medicinal importance. The teak (*Tectona grandis*), the timber of which is so largely employed for shipbuilding, is the species of most economic importance. The genera *Verbena*, *Lantana*, and *Clerodendron* contain several well-known garden-plants. Of the New Zealand genera, *Teucrium* is endemic; *Vitex* is found in nearly all warm countries; while *Avicennia* is widely spread on most tropical shores.

Tree. Leaves digitate. Corolla 2-lipped. Fruit a fleshy drupe	1. VITEX.
Slender shrub. Leaves small, entire. Corolla 2-lipped. Fruit separating into 4 pyrenes	2. TEUCRIDIMUM.
Maritime shrub. Leaves entire. Corolla regular. Fruit capsular	3. AVICENNIA.

1. VITEX, Linn.

Trees or shrubs. Leaves opposite, digitately 3–5-foliate, very rarely simple. Flowers in axillary or terminal cymes or panicles.

Calyx 5-toothed or -lobed. Corolla-tube short; limb oblique, 2-lipped; lobes 5, the lowest one usually larger than the rest. Stamens 4, didynamous, usually exserted; anther-cells distinct. Ovary 2-4-celled; ovules solitary or 2 in each cell; style filiform, shortly 2-lobed. Drupe globose or obovoid, more or less succulent; endocarp bony, usually 4-celled. Seeds obovate or oblong, albumen wanting.

A large genus of about 70 species, scattered through most tropical and sub-tropical regions, rare or absent in temperate climates. The New Zealand species is endemic.

1. **V. lucens**, T. Kirk in *Trans. N.Z. Inst.* xxix. (1897) 525.—A large handsome tree 40-60 ft. high, with a massive trunk 2-5 ft. diam., and a large crown of spreading branches; branchlets tetragonous, glabrous. Leaves on long stout petioles 3-5 in. long; leaflets 3-5, shortly petioled, 2-5 in. long, elliptic-oblong or obovate, abruptly acute or almost acuminate, entire, quite glabrous, dark-green and glossy. Flowers abundantly produced, dull-red, about 1 in. long, arranged in 4-15-flowered dichotomously branched axillary panicles. Calyx short, cup-shaped, truncate or obscurely 5-toothed. Corolla pubescent, 2-lipped; upper lip arched, entire or bifid; lower lip deflexed, 3-lobed. Drupe subglobose, bright-red, $\frac{2}{3}$ - $\frac{3}{4}$ in. diam.; endocarp bony, 4-celled; seeds seldom more than 1 or 2.—*V. littoralis*, A. Cunn. *Precur.* n. 390 (not of Decaisne); *Raoul*, *Choix*, 43; *Hook. Ic. Plant.* t. 419, 420; *Hook. f. Fl. Nov. Zel.* i. 203; *Handb. N.Z. Fl.* 223; *Kirk, Forest Fl.* t. 105.

NORTH ISLAND: Abundant from the North Cape to the Waikato and Upper Thames, then sparingly southwards to Mahia Peninsula and Cape Egmont. Sea-level to 2500 ft. *Puriri*; *Kauere*. June-October.

A well-known tree, producing the most valuable hardwood in the colony, extensively used for all purposes requiring great strength and durability, as railway-sleepers, the framework of bridges, piles, house-blocks, &c. Also greatly employed for furniture and cabinetwork, and quite equal in figure and general appearance to the best Italian or American walnut.

2. **TEUCRIDIMUM**, Hook. f.

A much-branched shrub; branchlets slender, 4-angled. Leaves small, opposite, petiolate, entire. Flowers axillary, solitary. Calyx broadly campanulate, 5-lobed; lobes acute. Corolla-tube short; limb oblique, spreading, 2-lipped, 5-lobed; the lower lobe the largest. Stamens 4, didynamous, attached to the base of the corolla-tube, far exserted; anthers 1-celled. Ovary villous at the tip, 4-lobed, imperfectly 4-celled; ovules 1 in each cell, pendulous; style slender, arcuate, 2-fid; branches subulate, shortly stigmatose. Fruit small, sunk in the persistent calyx, 4-lobed to the middle, ultimately splitting into 4 hispid pyrenes. Seed solitary in each pyrene, laterally affixed; albumen wanting; cotyledons large.

A peculiar monotypic genus confined to New Zealand. Although allied to *Vitex*, it has the anomalous character of a 4-lobed ovary, thus showing an approach to the *Labiata*.

1. **T. parvifolium**, *Hook. f. Fl. Nov. Zel. i. 203, t. 49*.—An erect much-branched shrub 2–5 ft. high; branches slender, twiggy, more or less pubescent. Leaves rather distant, petiolate; blade $\frac{1}{6}$ – $\frac{1}{2}$ in. long, ovate or orbicular-ovate or ovate-spathulate, obtuse, membranous; petioles short, equalling the blade. Flowers about $\frac{1}{3}$ in. long; peduncles short, 2-bracteolate. Calyx-lobes subulate. Corolla bluish, hairy. Fruiting-calyx $\frac{1}{6}$ in. diam.—*Handb. N.Z. Fl. 224*.

NORTH AND SOUTH ISLANDS: Lowland districts from Whangaroa North to Otago, rare and local. October–January.

3. **AVICENNIA**, Linn.

Littoral shrubs or small trees. Leaves opposite, quite entire, coriaceous. Flowers in contracted pedunculate cymes in the axils of the upper leaves or in trichotomous corymbs at the ends of the branches. Calyx short, 5-partite, unchanged in fruit. Corolla-tube short and broad; limb of 4 or 5 nearly equal spreading lobes. Stamens 4, inserted on the throat of the corolla; filaments short; anthers shortly exserted, ovate, cells parallel. Ovary imperfectly 4-celled by a 4-winged central column; ovules 4, pendulous between the wings of the column; style usually short, bifid. Capsule broad, compressed, coriaceous, 1-celled, 2-valved. Seed solitary, erect, consisting of a large embryo with the usual integuments very feebly developed; cotyledons large, folded longitudinally; radicle inferior, villous; plumule conspicuous, germinating before the fall of the fruit.

A genus comprising 2 or 3 very closely related species, widely spread along the shores of most tropical or subtropical countries.

1. **A. officinalis**, *Linn. Sp. Plant. 110*.—A shrub or small tree from 3 or 4 ft. to 15 or 25 ft. high or even more; roots putting up a multitude of stout asparagus-like suckers; branches spreading, the younger ones pubescent. Leaves 2–4 in. long, ovate or elliptic-oblong or ovate-lanceolate, usually acute, narrowed into a short petiole, glabrous above and black when dry, hoary with a short dense pubescence beneath. Cymes contracted into small heads on erect angular peduncles. Flowers small, about $\frac{1}{4}$ in. diam. Bracts and calyx-segments densely silky-tomentose. Corolla 4-lobed; lobes coriaceous, ovate, acute, silky externally. Ovary hairy. Capsule large, about 1 in. diam.—*Hook. f. Handb. N.Z. Fl. 224; Benth. Fl. Austral. v. 69; Kirk, Forest Fl. t. 130. A. tomentosa, Jacq. Enum. Pl. Carib. 25; A. Cunn. Precur. n. 389; Raoul, Choix, 43; Hook. f. Fl. Nov. Zel. i. 204. A. resinifera, Forst. Pl. Escul. 72; Prodr. n. 246; A. Rich. Fl. Nouv. Zel. 195.*

NORTH ISLAND: Muddy creeks and estuaries from the North Cape to Opotiki on the East Coast and Kawhia on the west. *Manawa; Mangrove.*

The Chatham Islands locality quoted in the Handbook on the authority of Dieffenbach is certainly erroneous. Probably he mistook flowerless specimens of *Olearia Traversii* for it. Forster's name of *A. resinifera* was applied under the supposition that it produced a gum-resin which was eaten by the Maoris. This mistake doubtless originated through drifted pieces of kauri-gum (which was formerly used by the Maoris as-a masticatory) having been picked up on some beach amongst the roots of *Avicennia*.

ORDER LIX. LABIATÆ.

Herbs or shrubs, the stems and branches usually quadrangular. Leaves opposite or whorled, frequently replete with glands containing an aromatic volatile oil; stipules wanting. Flowers hermaphrodite, irregular, solitary or in small axillary opposite cymes or clusters which are often aggregated into terminal spikes or racemes. Calyx inferior, persistent, 4-5-toothed or -cleft, or 2-lipped. Corolla gamopetalous, hypogynous; limb more or less 2-lipped, rarely equal; lobes 4-5, imbricate. Stamens inserted on the corolla-tube, usually 4 and then often didynamous, sometimes 2 only; anther-cells separate or confluent. Ovary superior, of 2 connate deeply 2-lobed carpels and hence 4-partite, 4-celled; style simple, proceeding from between the lobes of the ovary; stigma usually 2-fid; ovules solitary in each cell, erect, anotropous. Fruit enclosed in the persistent calyx, of 4 1-seeded nutlets. Seeds small, erect; albumen wanting or nearly so; radicle next the hilum.

A very large and exceedingly natural family, quite cosmopolitan in its distribution, but most abundant in the warm-temperate portion of the Northern Hemisphere. Genera close upon 150; species not far from 2600. Most of the species are strongly aromatic, and have stimulating or tonic properties. Some are used as condiments, as thyme, spearmint, sage, marjoram, sweet basil, &c. The essential oils obtained from peppermint, lavender, rosemary, and other species are used medicinally. Many brilliant garden-plants belong to the order, especially of the genus *Salvia*. The meagre representation of the family in New Zealand is one of the chief peculiarities of the Flora. Only 2 genera occur, both of which have a wide distribution in temperate and warm regions. On the other hand, many species of northern origin have become naturalised since the commencement of European settlement, as will be seen on reference to the list of introduced plants given in the appendix.

Calyx 10-nerved. Corolla almost regular, lobes flat. Sta-	mens 4, equal, erect	1. MENTHA.
Calyx 2-lipped, closing over the fruit. Corolla 2-lipped.	Stamens 4, didynamous	2. SCUTELLARIA.

1. MENTHA, Linn.

Strong-scented perennial herbs; rootstock creeping, stoloniferous. Leaves opposite. Flowers small, often axillary and solitary in the New Zealand species, but in others frequently arranged in many-flowered whorls or clusters, which are often aggregated into terminal

spikes. Calyx campanulate or tubular, 5-toothed, throat naked or villous. Corolla-tube short, not exceeding the calyx; limb 4-lobed; lobes nearly equal or the upper one broader. Stamens 4, equal, erect, distant; filaments glabrous; anther-cells 2, parallel. Style shortly bifid. Nutlets dry, ovoid, smooth, not bordered.

A widely spread genus, most abundant in Europe and northern Asia, where the species are highly variable and difficult of discrimination. The single New Zealand species is found nowhere else. Several of the European species have established themselves as weeds or garden-escapes, especially the pennyroyal (*M. pulegium*), corn-mint (*M. arvensis*), peppermint (*M. piperita*), and spearmint (*M. viridis*). Descriptions of these will be found in any English Flora.

1. *M. Cunninghamii*, *Benth. in D.C. Prodr.* xii. 174.—A fragrant perennial herb. Rhizome slender, wiry, prostrate, much branched. often matted; stems numerous from the rhizome, diffusely branched, pubescent, 2–12 in. long. Leaves shortly petiolate or nearly sessile, $\frac{1}{6}$ – $\frac{1}{2}$ in. long, broadly ovate or almost orbicular, obtuse, entire or with an obscure notch on each side, glandular-dotted. Flowers small, white, axillary, usually solitary but sometimes 2–3 in each axil; peduncles slender, variable in length. Calyx about $\frac{1}{8}$ in. long, tubular-campanulate, densely hairy; teeth villous within. Corolla-lobes almost equal, flat, spreading, upper one shortly bifid. Stamens equalling the corolla or slightly exserted. — *Hook. f. Fl. Nov. Zel.* i. 205; *Handb. N.Z. Fl.* 225. *M. consimilis*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 264. *Micromeria Cunninghamii*, *Benth. Lab. Gen. et Sp.* 730; *A. Cunn. Precur.* n. 391; *Raoul, Choix*, 43.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant throughout, in rather dry open grassy places. Sea-level to 4500 ft.

2. SCUTELLARIA, Linn.

Annual or perennial herbs or undershrubs. Flowers solitary or in pairs, axillary or in terminal racemes or spikes. Calyx campanulate, 2-lipped; lips entire, closed in fruit, the upper one bearing on its back a broad concave deciduous scale. Corolla-tube long, dilated above; limb 2-lipped, the upper one concave, entire or emarginate, the lower convex, dilated, 3-lobed. Stamens 4, didynamous; anthers conniving in pairs, ciliate, lower 1-celled, upper 2-celled. Upper lobe of the style very short. Nutlets small, granular-tuberculate or smooth.

A large genus of about 100 species, found in most parts of the world, but most abundant in America. The New Zealand species is endemic, but is closely allied to the Australian *S. humilis*, R. Br.

1. *S. novæ-zealandiæ*, *Hook. f. Fl. Nov. Zel.* ii. 335.—Stems slender, creeping and rooting at the base, erect or ascending above, sparingly branched, sparsely pilose or almost glabrous, 5–15 in. high. Leaves in distant pairs, on slender petioles $\frac{1}{4}$ – $\frac{3}{4}$ in. long; blade

$\frac{1}{6}$ – $\frac{1}{2}$ in., from ovate or ovate-oblong to orbicular or reniform, 3–5-lobed or -crenate or quite entire. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. long, white, solitary in the axils of the upper leaves; peduncles usually longer than the calyx, often secund. Calyx short, minutely pubescent; lips obtuse, rounded; scale at first shorter than the upper lip, but becoming much larger in fruit. Corolla pubescent, about twice as long as the calyx; lower lip rather longer than the upper one; lobes obtuse. Anthers glabrous.—*Handb. N.Z. Fl.* 226. *S. humilis*, *Hook. f. Fl. Nov. Zel.* i. 205 (not of R. Br.).

SOUTH ISLAND: Nelson—Maitai Valley and other localities near Nelson, T. F. C.; Foxhill, Bidwill, Monro, T. F. C. Marlborough—Pelorus and Tiniine Valleys, MacMahon!

Apparently a rare and local plant. It has been recorded from Banks Peninsula and Flagstaff Hill, near Dunedin, but I believe erroneously.

ORDER LX. PLANTAGINEÆ.

Perennial or annual usually stemless herbs. Leaves generally radical, tufted or spreading, simple, flat, nerved. Flowers regular, hermaphrodite or rarely unisexual, often dimorphic, generally in spikes terminating naked axillary scapes. Calyx inferior, persistent, deeply 4-partite, imbricate. Corolla gamopetalous, hypogynous, scarious; tube cylindric; limb with 4 spreading lobes with incurved margins. Stamens 4, rarely fewer, inserted on the tube of the corolla and alternate with its lobes; filaments usually long, capillary, exserted; anthers large, versatile. Ovary superior, 2–4-celled; style filiform, with two lines of stigmatic papillæ; ovules few or many affixed to the septum, or solitary and basal in each cell. Fruit a 1–4-celled capsule with transverse dehiscence. Seeds usually peltate; albumen fleshy; embryo cylindric, radicle inferior.

A small and very distinct order, widely spread over the globe, but most abundant in temperate regions. Genera 3; species variously estimated, from 60 to over 200. The properties of the order are unimportant, and the species are mostly of unattractive appearance.

PLANTAGO, Linn.

Annual or perennial herbs. Leaves all radical and rosulate, or rarely (in species not found in New Zealand) cauline and opposite or alternate. Scapes from the axils of the leaves, bearing at the top a few- or many-flowered spike of small greenish flowers. Flowers hermaphrodite, often dimorphic. Calyx-segments subequal. Corolla scarious, persistent, 4-lobed. Stamens 4, inserted on the tube of the corolla at or above the middle. Ovary 2-celled or spuriously 3–4-celled; ovules 1 to many in each cell. Capsule membranous, 2-celled or by abortion 1-celled, dehiscence circumscissile. Seeds laterally attached.

The genus includes the whole order except the monotypic genera *Littorella* and *Bougeria*, and has a world-wide distribution. With the exception of *P. Brownii*, which extends to Australia, all the New Zealand species are endemic. Several species from the Northern Hemisphere have become naturalised, the most abundant being *P. major*, Linn, and *P. lanceolata*, Linn.

* Scares many-flowered.

- | | |
|---|----------------------------|
| Leaves 2-4 in., ovate or obovate. Spikes 2-6 in. Capsule 2-seeded | 1. <i>P. aucklandica</i> . |
| Leaves 2-10 in., lanceolate. Spikes $\frac{1}{2}$ -1 in. Bracts and calyx-segments glabrous. Capsule 4-seeded | 2. <i>P. Raoulii</i> . |
| Leaves 1-5 in., oblong-lanceolate. Spikes $\frac{1}{2}$ -1 in. Bracts and calyx-segments pilose and ciliate | 3. <i>P. spathulate</i> . |

** Scares few-flowered. Plants small; leaves $\frac{1}{2}$ -2 in. long.

- | | |
|---|-------------------------|
| Leaves oblong-lanceolate, glabrous or sparsely pilose. Scape 1-8-flowered. Calyx-segments obtuse, glabrous. Capsule 8-seeded | 4. <i>P. Brownii</i> . |
| Leaves oblong-spathulate, densely clothed with tortuous woolly hairs. Scape 1-5-flowered. Calyx-segments subacute. Capsule 12-15-seeded | 5. <i>P. lanigera</i> . |
| Leaves linear or lanceolate, densely villous at the base. Scape 1-flowered. Calyx-segments very minute, obtuse. Corolla-lobes and stamens often 3. Capsule 20-30-seeded | 6. <i>P. triandra</i> . |
| Leaves linear-lanceolate, villous at the base. Scape 1-flowered. Calyx-segments acute, more than half as long as the capsule | 7. <i>P. uniflora</i> . |

1. *P. aucklandica*, Hook. f. *Fl. Antarct.* i. 64, t. 42.—Rhizome stout, often as thick as the thumb, 3-4 in. long, sometimes elongated above the ground, rarely branched at the top. Leaves all radical, densely crowded, 2-4 in. long, elliptic-obovate to obovate-lanceolate, obtuse or subacute, gradually narrowed into a short broad petiole, glabrous, fleshy, 7-10-nerved, remotely and obscurely sinuate-dentate; petioles villous at the very base with long soft brown hairs. Scares numerous, stout, pilose or pubescent, much longer than the leaves. Spikes 2-6 in. long; flowers small, sessile, densely packed above the middle of the spike, laxly placed towards the base. Bracts broadly ovate, obtuse, concave, glabrous, rather shorter than the calyx; corolla-lobes elliptic-oblong, acute, patent or reflexed. Capsule ovoid, about twice as long as the calyx, 2-seeded.—*Handb. N.Z. Fl.* 228.

AUCKLAND ISLANDS: Not uncommon on the hills, alt. 1000 ft., Sir J. D. Hooker, Kirk! F. R. Chapman!

A very distinct species, with something of the habit of the European *P. media*, Linn.

2. *P. Raoulii*, Decne. in *D.C. Prodr.* xiii. i. 703.—Rootstock short, stout. Leaves numerous, all radical, erect or rosulate, 2-10 in. long, oblong-lanceolate to linear-lanceolate, subacute, narrowed into a rather long broad petiole, irregularly sinuate-toothed or quite entire, 3-5-nerved, more or less pilose or almost

hispid; petioles villous at the base with long brown silky hairs. Scapes longer than the leaves, few or many, slender, strict, pilose, terminating in a rather dense spike $\frac{1}{3}$ –1 in. long. Bracts orbicular, obtuse, glabrous, broadly margined. Calyx-segments broadly ovate, with a thick fleshy keel and broad membranous margins, glabrous. Corolla-tube about as long as the calyx, lobes very small. Capsule twice as long as the calyx, conic, acute; seeds usually 4.—*Hook. f. Fl. Nov. Zel. i.* 208; *Handb. N.Z. Fl.* 228. *P. varia*, *A. Cunn. Precur. n.* 370. (not of *R. Br.*); *Raoul, Choix*, 44. *P. dasyphylla*, *Col. in. Trans. N.Z. Inst. xxiv.* (1892) 393.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common throughout, on moist banks, &c. Sea-level to 3500 ft. Flowers throughout the spring and summer.

Very closely allied to the Australian *P. varia*, which has become sparingly naturalised in the colony, but the spike is shorter and more glabrous, and the flowers are smaller.

3. ***P. spathulata***, *Hook. f. Fl. Nov. Zel. i.* 208.—Rootstock short, stout. Leaves numerous, all radical, spreading, rosulate, very variable in size and shape, 1–5 in. long, obovate-spathulate to oblong-spathulate or lanceolate-spathulate, obtuse or subacute, narrowed into rather long broad petioles, rather thick and fleshy, entire or more usually irregularly sinuate-toothed, sometimes almost pinnatifid, sparingly pilose or almost glabrate; petioles villous at the base. Scapes usually numerous, longer than the leaves, slender, villous or pilose; spike oblong, obtuse, densely many-flowered, $\frac{1}{4}$ –1 in. long. Bracts and calyx-segments broadly ovate, acute, with a thick fleshy centre, pilose and ciliate. Corolla-lobes ovate, acute. Capsule not much longer than the calyx, broadly oblong, apiculate. Seeds 3 or 4.—*Handb. N.Z. Fl.* 227.

NORTH ISLAND: East Cape district, *Bishop Williams*, *Adams* and *Petrie*! Hawke's Bay and coast between Castlepoint and Cape Palliser, *Colenso*! SOUTH ISLAND: Not uncommon throughout. Sea-level to 3500 ft.

Easily distinguished from *P. Raoulii* by the shorter and broader more rosulate leaves, shorter scapes, pilose and ciliate bracts and calyx-segments, and shorter and broader capsule.

4. ***P. Brownii***, *Rapin in Mem. Soc. Linn. Par. vi.* (1827) 485.—Small, tufted, rather fleshy. Rhizome short, stout, woolly amongst the leaves or quite glabrous. Leaves very numerous, all radical, spreading, rosulate, $\frac{1}{2}$ –2 in. long, oblong-lanceolate or spathulate, acute or obtuse, narrowed into a broad petiole, more or less sinuate-toothed or entire, rather thick and fleshy, glabrous or pilose with scattered jointed hairs. Scapes many, variable in length, equalling the leaves or much longer than them, pilose or glabrous. Flowers small, usually from 2 to 5, but in depauperated specimens the spike is often reduced to a single flower, and in large specimens the flowers may be as many as 6–8. Bracts and

calyx-segments broadly ovate, concave, obtuse or subacute, glabrous or sparingly pilose, keel thick, fleshy, margins scarious. Corolla-tube equalling the calyx, lobes ovate, acute, spreading or deflexed. Capsule small, ovoid, exceeding the calyx, 2-celled. Seeds usually 4 in each cell.—*Handb. N.Z. Fl.* 227; *Benth. Fl. Austral.* v. 141. *P. carnosa*, *R. Br. Prodr.* 425 (not of Lam.); *Hook. f. Fl. Antarct.* i. 65, t. 43; *Fl. Nov. Zel.* i. 207. *P. picta*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 481.

NORTH ISLAND: Mount Hikurangi, *Petrie!* Ruahine Range, *Colenso, Petrie!* Mount Egmont, *Buchanan!* *T. F. C.*; Tararua Range, *Buchanan!* SOUTH ISLAND, STEWART ISLAND, AUCKLAND ISLANDS: Not uncommon in mountain districts. Sea-level to 5500 ft. Also in Victoria and Tasmania.

The Auckland Island plant is almost glabrous, and has much more fleshy and more deeply toothed leaves, and the spikes are usually larger. It may be distinct from the North and South Island mountain-plant, but both forms require a careful study in the field. Mr. Colenso's *P. picta*, founded on a single specimen collected by Mr. H. Hill on a small island near to Gable-end Foreland (East Cape district), appears to be referable to *P. Brownii*, but the specimen is very imperfect.

5. *P. lanigera*, *Hook. f. Handb. N.Z. Fl.* 227.—A small depressed species. Rootstock short, stout. Leaves numerous, all radical, spreading, forming flat rosettes 1–2 in. across, $\frac{1}{3}$ –1 in. long, oblong-spathulate, obtuse or subacute, narrowed into a broad flat petiole, entire or obscurely sinuate-dentate, rather thick and fleshy, upper surface densely woolly with dirty white tortuous jointed hairs, under-surface woolly or almost glabrous. Scapes numerous, erect or inclined, at first much shorter than the leaves, but elongating as the fruit ripens, stout, densely tomentose. Spike short, 1–5-flowered; flowers small, crowded. Bracts and calyx-segments broadly ovate, subacute, glabrous, keel dark, thick and fleshy. Corolla-tube equalling the calyx; lobes ovate-lanceolate, acute. Capsule exceeding the calyx, broadly oblong, obtuse, 2-celled. Seeds 6 or 7 in each cell.

Var. *Petriei*.—Larger; leaves often 2 in. long, thinner, upper surface sparingly pilose with jointed hairs, glabrous or nearly so beneath, margins ciliate. Scapes longer, usually exceeding the leaves. Perhaps a distinct species.

SOUTH ISLAND: Nelson—Mountains above the Clarence Valley, *T. F. C.* Canterbury—*Armstrong*. Otago—Lake district, *Hector* and *Buchanan!* Old Man Range, *Hector* Mountains, Mount Pisa, Mount Cardrona, *Petrie!* 4000–6000 ft. Var. *Petriei*: Mount Kyeburn, alt. 3500 ft., *Petrie!*

The ordinary state of the species is easily recognised by the copious matted jointed hairs on the leaves, short densely tomentose scapes, and oblong obtuse many-seeded capsule.

6. *P. triandra*, *Berggr. in Minneskr. Fisiog. Sellsk. Lund.* (1877) 16, t. 4, f. 12–33.—Rootstock short, stout, crown densely clothed with long red-brown silky wool, rarely almost glabrous. Leaves nu-

merous, all radical, spreading, forming flat rosettes 1-3 in. across, $\frac{1}{2}$ -2 in. long, linear or lanceolate, acute, narrowed into broad flat petioles, entire or more usually sinuate-dentate or pinnatifid, rather thick or almost membranous, more or less pubescent with jointed hairs on the upper surface, the hairs sometimes arranged in transverse bands across the leaf, under-surface usually glabrous. Scapes very short in the flowering stage, concealed amongst the wool at the base of the leaves, often but not always elongating in fruit and attaining half the length of the leaves or even more, 1- or very rarely 2-flowered. Bract minute, ovate, obtuse. Calyx-segments 3 or 4, ovate, obtuse, very small, many times less than the ovary. Corolla-tube elongated, twice the length of the ovary, limb with 3 or 4 linear-oblong acute lobes. Stamens usually 3, sometimes 4. Capsule oblong, obtuse. Seeds numerous, angled, 20-30. —P. Hamiltoni, *Kirk in Trans. N.Z. Inst.* xi. (1879) 465.

SOUTH ISLAND, STEWART ISLAND: Margins of lakes and wet ground from Westport and Marlborough southwards, not uncommon. Sea-level to 3500 ft.

A very curious little plant. It varies considerably in the amount of the silky wool at the base of the leaves and in the hairiness of the leaves themselves, lowland specimens being often nearly glabrous. The length of the fruiting-scape is a very uncertain character; on the same plant it may either elongate or remain unaltered.

7. *P. uniflora*, Hook. f. *Fl. Nov. Zel.* i. 207.—“Stems short, stout, $\frac{1}{4}$ in. high, tufted (?), villous at the crown. Leaves few, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, narrow-lanceolate, sinuate-toothed or quite entire, glabrous, villous at the base; nerve 1, obscure. Scape slender, as long as the leaves, 1-flowered, hairy. Sepals linear-oblong, acute, longer than the lower half of the capsule.”—*Handb. N.Z. Fl.* 227.

NORTH ISLAND: Top of the Ruahine Range, Colenso. “Very near to *P. Brownii*, of which it may be a variety, but the leaves are narrower, scapes more slender, flowers solitary, and sepals narrower and more acute. My specimens are indifferent and past flower.”

I have quoted Hooker's description and remarks, the plant not having been observed since its first discovery. It is probably nearer to *P. triandra* than to *P. Brownii*, but the calyx-segments are apparently different.

ORDER LXI. NYCTAGINEÆ.

Herbs or shrubs or trees. Leaves opposite or less frequently alternate, simple, entire, exstipulate. Flowers hermaphrodite or unisexual, often involucrate, usually arranged in cymose panicles. Perianth inferior, petaloid, monophyllous; tube persistent and enveloping the fruit; limb with 3-5-plicate lobes. Stamens variable in number (1-30), usually 6-10, hypogynous; filaments often unequal, inflexed in bud; anthers didymous. Ovary superior, 1-celled; style simple, terminal; stigma small, entire or multifid;

ovule solitary, basilar, erect. Fruit a utricle with a membranous pericarp, firmly enclosed in the thickened or hardened base of the perianth-tube, which falls off with it. Seed erect, with a thin adherent testa; albumen farinaceous or fleshy; embryo with foliaceous cotyledons usually wrapped round the albumen, radicle inferior.

A small order, of no economical importance, with the exception of 2 or 3 wide-ranging genera almost wholly confined to tropical America. Genera 23; species about 200. The single New Zealand genus is distributed over the shores of most tropical countries.

1. PISONIA, Linn.

Trees or shrubs, usually unarmed, rarely spinous. Leaves opposite or scattered. Flowers unisexual or hermaphrodite, small, 2-3-bracteolate at the base, usually arranged in lax or dense cymose panicles. Perianth of the male flowers funnel-shaped or almost campanulate, of the females tubular, sometimes swollen at the base; limb 5-toothed; teeth short, induplicate-valvate, erect or patent. Stamens 6-10; filaments unequal, connate at the base into a tube or ring; anthers oblong or didymous, exserted or included. Ovary elongated, narrowed into a slender included or exserted style; stigma obliquely capitate or dilated, often fimbriate. Fruiting perianth elongated or oblong, 5-ribbed or cylindrical, smooth or glandular-muricate, usually viscid, firmly enclosing the membranous utricle. Seed solitary, oblong, longitudinally grooved; embryo straight, the cotyledons convolute, enclosing the scanty albumen.

A large genus in tropical and subtropical America, with a few species in southern Asia, Australia, Polynesia, and the Mascarene Islands. The New Zealand species occurs in Norfolk Island and Australia, and may possibly have a wider range.

1. *P. Brunoniana*, *Endl. Prodr. Fl. Norfl.* 43.—A glabrous shrub or small tree, usually 12-20 ft. high, but sometimes attaining 35 ft. with a trunk 2 ft. in diam.; wood soft, brittle. Leaves usually opposite, but often irregularly alternate or sometimes approximate in threes, petiolate, 4-15 in. long, oblong to ovate-oblong or elliptic-oblong, obtuse or subacute, quite entire, membranous and flaccid when young, but becoming firm in age. Cymes much branched, terminal, many-flowered. Flowers usually hermaphrodite, but sometimes the stamens are abortive. Perianth $\frac{1}{5}$ in. long, greenish, glabrous or puberulous, funnel-shaped with a campanulate mouth. Stamens 6-8; anthers equalling the perianth or slightly exserted. Fruit 1-1 $\frac{1}{4}$ in. long, linear, narrowed above, 5-ribbed; ribs minutely papillose, extremely viscid.—*Handb. N.Z. Fl.* 229; *Benth. Fl. Austral.* v. 280; *Kirk, Forest Fl.* t. 140. *P. Sinclairii*, *Hook. f. Fl. Nov. Zel.* i. 209, t. 50. *P. Mooreiana*, *F. Muell. Fragm.* i. 20.

KERMADEC ISLANDS: Not uncommon, *T. F. C.* NORTH ISLAND: Three Kings Islands, *T. F. C.*; Whangape Harbour, *Berggren*, *McLennan*! between Whangarei and Ngunguru, *Colenso*! Hen and Chickens Islands, *Kirk*! *T. F. C.*; Great Barrier Island, Arid Island, *Kirk*! Little Barrier Island, Cuvier Island, *T. F. C.*; Cabbage Bay, *Adams*! East Cape, *Bishop Williams*! Sea-level to 500 ft. *Parapara*. Flowers most of the year.

Also found in Norfolk Island, Lord Howe Island, New South Wales, and Queensland. The fruits are so excessively viscid that small birds, such as the white-eye (*Zosterops*) and fantail (*Rhipidura*), are often caught and glued down by the feathers, and fail to free themselves.

ORDER LXII. ILLECEBRACEÆ.

Annual or perennial often tufted herbs. Leaves opposite or alternate, simple; stipules scarious (wanting in *Scleranthus*). Flowers usually hermaphrodite, regular, inconspicuous. Perianth (calyx) inferior, herbaceous or coriaceous, persistent and often hardened in fruit; lobes 4-5, imbricate. Petals usually wanting. Stamens hypogynous or perigynous, as many as the perianth-lobes and opposite to them or fewer by abortion, sometimes a single one only; filaments short, subulate; anthers small, didymous. Ovary superior, ovoid, 1-celled; style terminal, 2-3-fid; ovule solitary, erect or pendulous from a basal funicle. Fruit a utricle enclosed in the persistent perianth. Seed with farinaceous albumen; embryo usually annular.

A small order, found in most parts of the world, mainly composed of weedy inconspicuous plants of no economic value. Genera 17; species about 90. The New Zealand genus is found in the temperate regions of both hemispheres.

1. *SCLERANTHUS*, Linn.

Small rigid usually densely tufted annual or perennial herbs. Leaves opposite, connate at the base, subulate, often serrulate; stipules wanting. Flowers small, green, axillary, solitary or 2 together, or in little cymes or fascicles. Perianth funnel-shaped or urceolate or turbinate, 4-5-toothed or-lobed. Stamens 1, 2, 5, or 10, inserted on the throat of the perianth; filaments subulate; anthers didymous. Ovary ovoid; styles 2, distinct; stigmas capitellate. Fruit a membranous utricle enclosed in the persistent and hardened perianth. Seed lenticular; testa smooth; embryo annular.

Species about 12, scattered through Europe, temperate and subtropical Asia, Africa, and Australasia. The single New Zealand species is also found in Australia.

1. *S. biflorus*, *Hook. f. Fl. Nov. Zel.* i. 74.—A small densely branched glabrous or minutely pubescent perennial herb, usually forming compact cushions 1-4 in. diam. or more, rarely laxly branched with the stems creeping and elongating to 6 in. Leaves crowded and imbricating, rarely remote, $\frac{1}{10}$ – $\frac{1}{12}$ in. long, narrow-

linear, acute, concave, minutely serrulate, coriaceous. Peduncles axillary, solitary, very short in the flowering stage, but lengthening in fruit and overtopping the leaves. Flowers minute, in pairs or more rarely solitary at the top of the peduncle, sessile within 4 minute concave bracts placed crosswise. Perianth 4-lobed. Stamen 1, inserted on an annular membrane near the mouth of the perianth. Fruiting perianth about $\frac{1}{12}$ in. long, hard, ovoid at the base; lobes erect. Utricle membranous, included.—*Handb. N.Z. Fl.* 234; *Benth. Fl. Austral.* v. 259. *Mniarum biflorum*, *Forst. Char. Gen.* 2, t. 1; *Prodr.* n. 6; *A. Rich. Fl. Nouv. Zel.* 319; *A. Cunn. Precur.* n. 368; *Raoul, Choix*, 43. *M. fasciculatum*, *Raoul, l.c. (not of R. Br.)*. *Ditoca muscosa*, *Banks ex Gaertn. Fruct.* ii. 196, t. 126.

NORTH AND SOUTH ISLANDS: Abundant throughout, from the Three Kings Islands and the North Cape to Foveaux Strait. Sea-level to 4000 ft.

ORDER LXIII. AMARANTACEÆ.

Herbs, rarely shrubs. Leaves opposite or alternate, simple and entire, exstipulate. Flowers hermaphrodite or unisexual, usually regular, generally arranged in spikes or cymes or clusters, each flower seated within 2 scarious bracteoles and subtended by a larger scarious bract. Perianth inferior, persistent, rigid and scarious, often coloured, of 4–5 free or slightly connate segments, imbricate in bud. Stamens hypogynous, 4–5, seldom fewer, opposite to the sepals; filaments free or connate, or united with intervening staminodia into a cup-shaped ring; anthers 1- or 2-celled. Ovary superior, 1-celled; style long or short, simple or divided into 2–3 branches or separate styles; ovules 1 or more, attached to a slender basal funicle. Fruit usually a membranous utricle, rarely a capsule or berry, enclosed or resting upon the persistent perianth. Seeds 1 or more, usually compressed, vertical; albumen farinaceous; embryo annular or curved.

A moderate order, comprising 48 genera and nearly 500 species, most plentiful in tropical or warm countries, absent in cold climates or on the tops of high mountains. Some species of *Amarantus* and *Celosia* (cockscomb) are often cultivated in gardens, but as a whole the order is composed of weedy unattractive plants possessing no useful properties. The only New Zealand genus is found in all warm countries.

1. ALTERNANTHERA, Forsk.

Annual or perennial herbs, usually prostrate or decumbent, rarely erect, glabrous or more or less pubescent or tomentose. Leaves opposite. Flowers small, whitish, capitate; heads sessile in the axils of the leaves, often clustered. Perianth 5-partite; segments unequal, the anterior and 2 posterior flattened, the 2 lateral innermost, concave. Stamens 2–5; filaments short, connate at the

base into a membranous cup, with or without intervening staminodia; anthers 1-celled. Ovary orbicular or obovoid; style short or almost wanting; stigma capitate or rarely 2-fid; ovule solitary, pendulous from an elongated basal funicle. Utricle compressed, ovoid or orbicular or obcordate; margins often thickened or winged. Seed vertical, lenticular; testa coriaceous.

A small genus of 16 or 18 species, mainly tropical or subtropical, most abundant in America. The New Zealand species is a common weed in warm countries.

1. *A. sessilis*, *R. Br. Prodr.* 417.—A prostrate or decumbent herb. Stems numerous from the root, branched, creeping and rooting, sometimes ascending at the tips, 4–18 in. long, glabrous or with 2 opposite pubescent lines. Leaves variable in size, $\frac{1}{2}$ –3 in. long, linear-lanceolate to linear-oblong or oblong-obovate, obtuse or acute, narrowed to the base, entire or obscurely denticulate, glabrous or pubescent in the axils. Flowers aggregated in dense axillary clusters $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. minute, whitish, about $\frac{1}{12}$ in. long. Perianth-segments glabrous, rigid, acute. Stamens 2–3. Utricle broadly obcordate, with broad corky wings.—*Hook. f. Fl. Nov. Zel.* i. 212; *Handb. N.Z. Fl.* 234. *A. denticulata*, *R. Br. Prodr.* 417; *A. Cunn. Precur.* n. 367; *Raoul, Choix*, 43; *Benth. Fl. Austral.* v. 249.

NORTH ISLAND: Marshy places from the North Cape southwards to Rotorua and Hawke's Bay, rare and local to the south of Auckland. Sea-level to 1000 ft.

ORDER LXIV. CHENOPODIACEÆ.

Annual or perennial herbs or shrubs, usually succulent and fleshy, sometimes covered with a mealy scurf. Leaves alternate or very rarely opposite, simple, sometimes wanting, exstipulate. Flowers small, regular, hermaphrodite or unisexual, often dimorphic, variously disposed but usually sessile and clustered, clusters often aggregated into dense or interrupted spikes or panicles. Bracts often wanting, when present herbaceous, not scarious. Perianth inferior, 3–5-lobed or -cleft, herbaceous, persistent, imbricate. Stamens 4–5, rarely fewer, hypogynous or perigynous; filaments subulate or filiform; anthers 2-celled. Ovary superior, 1-celled; style-branches 2–3, either free or united at the base; ovule solitary, basal or lateral, amphitropous. Fruit usually a utricle, rarely a berry, enclosed in the persistent perianth, which is often enlarged or fleshy. Seed horizontal or vertical, testa crustaceous; albumen present and farinaceous or wanting; embryo curved or annular or spiral.

A widely spread order, found in all climates, but most plentiful in maritime or saline localities. Genera 80; species between 500 and 600, often difficult of discrimination. The order includes the sugar-beet and mangold, two plants of great commercial importance; also the garden-beet, the spinach,
19—Fl.

and orache. Many of the species are common weeds of cultivation, and several of these have become naturalised in New Zealand. Of the 6 indigenous genera, 5 are widely spread in temperate and tropical climates, the remaining one (*Rhagodia*) is confined to Australia and New Zealand.

A. Stems leafy, not jointed. Stamens 3-5.

Flowers hermaphrodite or unisexual. Perianth hardly enlarged in fruit. Fruit a berry. Embryo annular ..	1. RHAGODIA.
Flowers usually hermaphrodite. Perianth hardly enlarged in fruit. Fruit a dry utricle. Embryo annular ..	2. CHENOPODIUM.
Flowers unisexual; females enclosed within 2 bracts which are much enlarged in fruit. Embryo annular ..	3. ATRIPLEX.
Leaves fleshy, semiterete. Perianth simply enlarged and fleshy in fruit. Embryo spiral	5. SUÆDA.
Leaves fleshy, pungent-pointed. Perianth enlarged and winged in fruit. Embryo spiral	6. SALSOLA.

B. Stems jointed, leafless. Stamens 1 or 2.

Flowers sunk in cavities between the joints	4. SALICORNIA.
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1. RHAGODIA, R. Br.

Shrubs or more rarely herbs. Leaves alternate or subopposite, sessile or petiolate. Flowers small, hermaphrodite or monœcious, rarely diœcious, sessile or very shortly pedicelled, in axillary clusters or in terminal spikes or panicles; bracts wanting. Perianth 5-lobed or -partite; segments obtuse, concave, hardly enlarged in fruit. Stamens 5 or fewer, inserted at the base of the perianth; filaments subulate, flattened. Ovary subglobose; styles 2 or very rarely 3, linear or subulate. Fruit a small globose or depressed-globose berry, free from the perianth. Seed horizontal, flattened; testa crustaceous; embryo annular, surrounding the copious mealy albumen.

A small genus of 11 species, all Australian, but one of them found in New Zealand as well.

1. *R. nutans*, R. Br. *Prodr.* 408.—A much-branched prostrate or procumbent herb, green or the young leaves and branches more or less clothed with white mealy tomentum; stems 9-24 in. long, usually hard and woody at the base. Leaves opposite and alternate, petiolate, $\frac{1}{4}$ -1 in. long, lanceolate or oblong-lanceolate or hastate, acute, cuneate or truncate or cordate at the base, entire, rather thin. Flowers minute, polygamous or diœcious, arranged in short loose-flowered spikes or panicles in the upper axils or terminating the branches. Perianth-segments ovate, obtuse, mealy-tomentose. Male flowers usually with 3 stamens; female flowers with 1 or 2 abortive stamens. Ovary depressed-globose; styles 2. Fruit globose, fleshy, bright-red, $\frac{1}{8}$ in. diam.—*Benth. Fl. Austral.* v. 156; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 408.

KERMADEC ISLANDS, NORTH ISLAND: Rocky places near the sea, not uncommon. Also plentiful in east Australia, from Queensland southwards.

Closely resembles *Chenopodium triandrum* in habit and foliage, and is easily mistaken for it in the absence of fruit. It probably occurs in the South Island, but I have seen no specimens from thence.

2. CHENOPODIUM, Linn.

Annual or perennial erect or prostrate herbs, rarely woody at the base, mealy or glandular-pubescent, seldom glabrous. Leaves alternate, entire or lobed or toothed. Flowers minute, greenish, usually hermaphrodite, sessile in clusters; clusters axillary or in terminal spikes or panicles. Perianth 5-partite, rarely 3-4-partite; segments obtuse, incurved and concave, not at all or very slightly altered in fruit. Stamens 5 or fewer; filaments filiform or flattened, sometimes connate at the base. Ovary depressed or ovoid, styles 2-3, free or united at the base. Fruit an ovoid or depressed membranous utricle, wholly or partially included in the persistent perianth. Seed horizontal or vertical; testa crustaceous; embryo annular, enclosing the copious mealy albumen.

A widely distributed genus of from 50 to 60 species, most abundant in temperate climates. Of those described below, three are common in many parts of the world as weeds of cultivation or wayside plants, and may not be true natives of New Zealand.

* Seed horizontal (rarely vertical in *C. glaucum*).

- | | |
|---|-----------------------------|
| Intensely foetid, prostrate or decumbent, mealy-pulverulent. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., triangular-hastate, entire. Flowers in small dense axillary clusters | 1. <i>C. detestans</i> . |
| Prostrate or trailing, often glaucous, mealy-pulverulent. Leaves $\frac{1}{4}$ -1 in., triangular-oblong or hastate, entire. Flowers in lax axillary or terminal spikes or panicles .. | 2. <i>C. triandrum</i> . |
| Prostrate, fleshy. Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., oblong or deltoid, sinuate-lobed, mealy beneath. Flowers in axillary or terminal spikes | 3. <i>C. glaucum</i> . |
| Erect or spreading, green or slightly mealy. Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., triangular or rhomboid, toothed or lobed. Flowers in axillary or terminal spikes or panicles .. | 4. <i>C. urbicum</i> . |
| Erect, aromatic, glandular-pubescent, not mealy. Leaves 1-4 in., ovate-lanceolate, sinuate-toothed. Flowers very numerous, in slender axillary spikes | 5. <i>C. ambrosioides</i> . |

** Seed vertical.

- | | |
|--|--------------------------|
| Glandular-pubescent. Stems 6-18 in., decumbent below, erect above. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong, sinuate-lobed or pinnatifid. Flowers in dense axillary fascicles .. | 6. <i>C. carinatum</i> . |
| Small, glandular-pubescent, much branched, prostrate, 2-6 in. long. Leaves $\frac{1}{10}$ - $\frac{1}{2}$ in., broadly oblong or orbicular, obscurely sinuate. Flowers in axillary glomerules .. | 7. <i>C. pusillum</i> . |

1. *C. detestans*, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 550.—A much-branched prostrate or decumbent herb, more or less clothed with a whitish granular meal, and with a strong and offensive

odour of stale fish; branches numerous from the root, slender, spreading, 6–18 in. long. Leaves on slender petioles; blade $\frac{1}{6}$ – $\frac{1}{2}$ in. long, rarely more, triangular-hastate or rhomboid-ovate, acute, cuneate at the base, entire or with a single tooth on each side. Flowers small, abundantly produced, in dense oblong or globose axillary fascicles, often becoming leafy spikes at the tips of the branches. Perianth-segments 4 or 5, oblong, obtuse, membranous, not completely concealing the fruit. Stamens usually 4. Utricle small, horizontal, depressed, brownish-black, minutely punctulate.

SOUTH ISLAND: Canterbury—Broken River Basin, *Enys!* *Kirk!* *T. F. C.!* Lake Coleridge, *Enys!* Otago—Lakes Wanaka and Hawea, *Kirk!* *Petrie!* Maniototo Plain, Cromwell, and other localities in the north and central portions of the province, *Petrie!* 1000–3000 ft. January–March.

Closely allied to the northern *C. vulvaria*, Linn., but a smaller plant with smaller often hastate leaves, and with the flowers in dense globose fascicles.

2. *C. triandrum*, *Forst. Prodr.* n. 129.—A much-branched prostrate or trailing herb, pale-green, glabrous or more or less mealy-tomentose; stems slender, 6–18 in. long, sometimes almost woody at the base. Leaves opposite or alternate, petiolate, $\frac{1}{4}$ –1 in. long, very variable in shape, broadly oblong or orbicular to broadly triangular-hastate, obtuse or rounded at the tip, cuneate or rounded or truncate at the base, thin and membranous, green and glabrous or slightly mealy; petioles slender. Flowers very minute, farinose, in axillary or terminal lax-flowered spikes or panicles. Perianth-segments 4, oblong, obtuse. Stamens 2–4. Styles 2–3. Utricle depressed, more or less covered by the persistent perianth. Seed horizontal, minutely punctate, adherent to the utricle.—*A. Rich. Fl. Nouv. Zel.* 180; *A. Cunn. Precur.* n. 361; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 212; *Handb. N.Z. Fl.* 230.

NORTH AND SOUTH ISLANDS: From the North Cape southwards to Foveaux Strait, not uncommon near the sea, rare and local inland. November–March.

3. *C. glaucum*, *Linn. Sp. Plant.* 220.—A much-branched prostrate fleshy and succulent annual herb; branches widely spreading, flaccid, glabrous, striate, 4–18 in. long, rarely ascending at the tips. Leaves petiolate, the lower ones $\frac{1}{2}$ –1½ in. long, oblong-lanceolate to ovate-oblong or rhomboid, usually obtuse at the tip, cuneate at the base, coarsely and angularly sinuate-toothed or -lobed, fleshy when fresh, thin when dry, green and glabrous above, white with mealy down beneath; upper ones smaller and narrower and more entire. Flowers small, in little clusters arranged in simple or compound axillary or terminal spikes, which are usually more or less farinose. Fruiting-perianth 3–5-partite; segments short, obtuse, appressed to the fruit but not altogether concealing it. Seed horizontal or occasionally vertical, smooth, margins obtuse.

A. Cunn. Precur. n. 363; *Raoul. Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 213; *Handb. N.Z. Fl.* 230; *Benth. Fl. Austral.* v. 161. *C. ambiguum*, *R. Br. Prodr.* 407.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common throughout in muddy or sandy places near the sea, also occasionally found in saline localities inland. November–March.

Also occurs in Australia and Tasmania, and common in many parts of Europe and temperate Asia, &c. The New Zealand and Australian plant is sometimes kept as a separate variety or species (*C. ambiguum*, *R. Br.*), but the differences appear to be slight and inconstant.

4. *C. urbicum*, *Linn. Sp. Plant.* 218.—A coarse erect or spreading branching herb 1–2 ft. high or more, green and glabrous or rarely slightly mealy; stem angled, grooved. Lower leaves on slender petioles $\frac{1}{2}$ –1 in. long; blade $\frac{3}{4}$ –1 $\frac{1}{2}$ in., triangular or rhombic-ovate, coarsely and irregularly toothed and lobed, rather thin, green on both surfaces, veined; upper smaller, narrower, more acute. Flowers small, in little clusters arranged in dense leafless axillary spikes, or in terminal panicles which are leafy below. Stamens 5, exserted. Styles short. Fruiting-perianth $\frac{1}{5}$ in. diam.; segments obtuse, not completely covering the utricle. Seed horizontal, much depressed, minutely punctulate, margins obtuse.—*Hook. f. Fl. Nov. Zel.* i. 213; *Handb. N.Z. Fl.* 230.

NORTH ISLAND: East Coast, *Colenso*! Has also appeared as a naturalised plant near Wellington. SOUTH ISLAND: Not uncommon, especially in South Canterbury and Otago. Sea-level to 1000 ft. December–March.

A common European weed, which has become naturalised in North America and some other countries. It is probably not a true native of New Zealand.

5. *C. ambrosioides*, *Linn. Sp. Plant.* 219.—An erect much-branched strong-smelling glandular annual herb 1–3 ft. high; branches slender, strict, leafy. Leaves shortly petiolate, 1–4 in. long, ovate- or oblong-lanceolate to lanceolate, acute or acuminate, cuneate at the base, coarsely sinuate-toothed or -lobed, membranous, glabrous or pubescent, green, not mealy; upper ones gradually smaller, linear-lanceolate, entire or nearly so. Flowers exceedingly numerous, very minute, in little clusters in slender axillary often elongated spikes, frequently so copiously produced as to render the upper portion of the plant a large leafy panicle. Stamens 5. Styles 3–4, elongate. Fruiting-perianth about $\frac{1}{2}$ in. diam., segments closed over the fruit and completely enclosing it. Seed horizontal or rarely vertical, smooth, polished, shining, margins obtuse.—*Hook. f. Fl. Nov. Zel.* i. 213; *Handb. N.Z. Fl.* 230; *Benth. Fl. Austral.* v. 162.

NORTH ISLAND: Warm lowland stations from the North Cape to Taranaki and Hawke's Bay, not common. Has also appeared as a naturalised plant near Wellington. December–April.

Easily distinguished by the erect glabrous habit, strong aromatic smell, large comparatively narrow leaves, and long slender spikes of very small flowers. It is widely distributed in many warm climates.

6. **C. carinatum**, *R. Br. Prodr.* 407.—A much-branched strong-smelling glandular-pubescent herb; stems usually decumbent at the base, erect or ascending above, 6–18 in. long. Leaves on slender petioles; blade variable in size, $\frac{1}{4}$ – $\frac{3}{4}$ in. long or more, oblong-lanceolate to oblong or ovate-oblong, obtuse, cuneate at the base, sinuate-lobed or -pinnatifid, rather thick, both surfaces rough with glandular pubescence. Flowers small, very copiously produced, in dense glomerules occupying almost all the axils, sometimes elongated into short leafy spikes. Perianth-segments 5, erect, incurved over the fruit, more or less glandular-pubescent. Stamen usually 1. Utricle small, compressed, erect, the pericarp adherent to the seed.—*Hook. f. Fl. Nov. Zel.* i. 213; *Handb. N.Z. Fl.* 231; *Benth. Fl. Austral.* v. 162. C. botrys, *A. Cunn. Precur.* n. 362 (not of *Linn.*). Blitum carinatum and B. glandulosum, *Moq. in D.C. Prodr.* xiii. ii. 81, 82.

NORTH AND SOUTH ISLANDS: Warm dry soils from the North Cape to central Otago, rare and local. December–March.

A common Australian plant. It was collected at the Bay of Islands by Cunningham, and may be truly native in the North Auckland peninsula. Elsewhere it is doubtless naturalised.

7. **C. pusillum**, *Hook. f. Handb. N.Z. Fl.* 231.—A much-branched decumbent or prostrate glandular-pubescent little plant; branches spreading on all sides, 2–6 in. long, slender, leafy, ascending at the tips. Leaves on slender petioles; blade very variable in size, $\frac{1}{10}$ – $\frac{1}{3}$ in. diam. or more, broadly oblong to ovate-oblong or orbicular, rounded at the tip, quite entire or obscurely sinuate, rather thin, both surfaces glandular-pubescent, veins prominent beneath. Flowers very minute, in small and dense few- or many-flowered axillary glomerules. Perianth-segments usually 4, erect, linear-oblong, concave, membranous, pubescent, incurved over the fruit but not completely concealing it. Stamen usually 1. Utricle small, erect, ovate, compressed, the pericarp not adhering to the seed.—*C. pumilio*, *Hook. f. Fl. Nov. Zel.* i. 214 (not of *R. Br.*).

NORTH ISLAND: Sandy shores of the East Coast and Lake Taupo, *Colenso*! SOUTH ISLAND: Near Nelson, *Captain F. W. Hutton*! Lake Lyndon (Canterbury), *Enys*! *Kirk*! *T. F. C.* Sea-level to 2500 ft.

I have had no opportunity of comparing this with the closely allied *C. pumilio*, *R. Br.*, from Australia. According to Hooker, it is mainly distinguished by the membranous perianth-segments.

3. **ATRIPLEX**, *Linn.*

Herbs or shrubs, usually more or less mealy or scurfy-tomentose. Leaves alternate or rarely opposite. Flowers unisexual, usually in clusters arranged in simple or paniced spikes, the sexes distinct or mixed in the clusters. Male flowers ebracte-

ate. Perianth 3-5-partite; segments oblong or obovate, obtuse. Stamens 3-5. Female flowers 2-bracteate; bracts small at first, erect and appressed, distinct or more or less connate, enlarged in fruit and forming a variously shaped 2-valved covering to the utricle. Perianth wanting or very rarely of 2-5 hyaline segments. Ovary small; styles 2, filiform. Utricle entirely concealed within the base of the greatly enlarged and thickened bracts; pericarp thin, membranous. Seed compressed, vertical or very rarely horizontal; testa thin, crustaceous or coriaceous; embryo annular, surrounding the copious mealy albumen.

A large genus of about 120 species, widely spread through most parts of the globe, but chiefly along sea-coasts or in saline localities. One of the New Zealand species is a weed of probably northern origin, two others are found in Australia, the fourth is endemic.

- Erect branching shrub 1-4 ft. high, white with scurfy tomentum. Leaves 1-2 in., oblong, entire. Fruiting-bracts $\frac{1}{2}$ in., ovate-rhomboid 1. *A. cinerea*.
 Erect or diffuse annual 1-2 ft. high, green or sparingly mealy. Leaves 1-3 in., lanceolate to deltoid, entire or toothed. Fruiting-bracts $\frac{1}{10}$ - $\frac{1}{8}$ in., ovate-rhomboid .. 2. *A. patula*.
 Prostrate, much branched, 3-9 in. diam., white with scurfy tomentum. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong to orbicular, entire or sinuate. Fruiting-bracts ovoid, very minute .. 3. *A. Buchanani*.
 Prostrate, glabrous, fleshy, clothed with watery papillæ, 6-18 in. long. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong, entire or toothed. Fruiting-bracts urceolate. Utricle transverse to the bracts, not parallel 4. *A. Billardieri*.

1. *A. cinerea*, Poir. *Encycl. Suppl.* i. 471.—A small branching shrub 1-4 ft. high, clothed in all its parts with densely appressed white or grey scurfy tomentum; stem woody; branches stout, angled, leafy. Leaves 1-2 in. long, linear-oblong or lanceolate, obtuse, narrowed into a short petiole, quite entire, midrib prominent beneath. Flowers dioecious or almost so; males in dense many-flowered simple or branched oblong spikes, which are often panicked at the ends of the branches. Females in small axillary clusters on the female plant, with occasionally 1 or 2 solitary in the axils of the upper leaves of the male plant. Fruiting-bracts greatly enlarged, about $\frac{1}{4}$ in. long, broadly ovate-rhomboid, subacute; disc thick and corky, swollen over the utricle, smooth or rarely tuberculate; margins thin. Utricle compressed, at the base of the bracts.—*Hook. f. Fl. Nov. Zel.* i. 214; *Handb. N.Z. Fl.* 232; *Benth. Fl. Austral.* v. 171.

NORTH ISLAND: Wellington—Sandy shores of Palliser Bay, *Colenso*! SOUTH ISLAND: Vicinity of Nelson, *P. Lawson*! Also recorded from Canterbury, but I have seen no specimens from thence.

A common plant in many parts of Australia and Tasmania, and very closely allied to the European and African *A. Halimus*, Linn.

2. **A. patula**, Linn. *Sp. Plant.* 1053.—A very variable erect or decumbent or prostrate annual herb 1–2 ft. high, green and smooth, or sparingly mealy-white. Leaves petiolate, 1–3 in. long, lanceolate to broadly triangular-hastate, acute or obtuse, entire or coarsely sinuate-toothed; the uppermost often smaller and linear, the lowest sometimes opposite. Flowers small, monœcious, in clusters arranged in rather slender spikes, often forming narrow terminal panicles; the male and female flowers mixed or occasionally some of the females form separate axillary clusters. Male perianth small, 5-partite. Fruiting-bracts ovate-rhomboid or deltoid, acute, the disc smooth or tubercled; margins toothed or entire.—*Hook. f. Fl. Nov. Zel.* i. 215; *Handb. N.Z. Fl.* 232; *Benth. Fl. Austral.* v. 173.

NORTH AND SOUTH ISLANDS: Not uncommon in brackish-water swamps and other places near the sea from the Thames River southwards. December–March.

Now plentiful in almost all temperate parts of the world, either native or naturalised. How far it is indigenous in Australia and New Zealand is now very difficult to determine. The broad-leaved form known as var. *hastata* is the one most generally seen, but the more slender var. *littoralis* is also met with.

3. **A. Buchanani**, T. Kirk, MSS.—An excessively branched prostrate herb, forming broad depressed greyish-white patches 3–9 in. across; stem woody at the base; branchlets slender, wiry, terete. Leaves shortly petiolate or almost sessile, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, oblong or oblong-ovate to suborbicular, rounded at the tip, quite entire, both surfaces densely clothed with white scurfy tomentum. Flowers minute, monœcious. Males in few-flowered clusters in the axils of the upper leaves or terminal, sometimes solitary. Perianth densely farinose, 5-partite; segments oblong, obtuse, incurved at the tip. Stamens 5, exserted; filaments filiform. Females solitary or in clusters of 2–5 in the lower axils, occasionally a few females at the base of the male clusters. Fruiting-bracts connate into an ovoid or almost urceolate 2-lipped cup. Utricle suborbicular, compressed, sunk within the base of the bracts.—*Chenopodium Buchanani*, Kirk in *Trans. N.Z. Inst.* xxii. (1898) 447, t. 32, f. 1.

NORTH ISLAND: Sea-cliffs near Wellington, *Buchanan!* Kirk! SOUTH ISLAND: Marlborough—The Brothers Rocks, *Robson!* Canterbury—Near the mouth of the Rangitata, *Enys!* Otago—Green Island and cliffs on the East Coast, *Petrie!* saline places in the interior, Maniototo Plains, Ida Valley, Cromwell, *Petrie!* Centre Island (Foveaux Strait), *Kirk!* Sea-level to 1800 ft. December–March.

A distinct little species. Some immature specimens in Mr. Kirk's herbarium from Cargill Cliffs, near Dunedin, are more sparingly branched and have much larger leaves, and may form a separate variety.

4. **A. Billardieri**, Hook. *f. Fl. Nov. Zel.* i. 215.—A much-branched glabrous and succulent prostrate herb, everywhere covered with shining watery papillæ; branches 6–18 in. long, spreading on

all sides. Leaves shortly petiolate, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, oblong or obovate, obtuse, entire or sinuate-toothed, very thick and fleshy. Flowers small, monœcious. Males fascicled at the tips of the branches, ebracteate. Perianth 5-partite; segments oblong, obtuse. Stamens 5, exserted; filaments filiform, connate at the very base. Females solitary or 2 together in the axils of the cauline leaves, minute, sessile. Fruiting-bracts combined into a shortly 2-lipped fleshy urceolate cup. Perianth wanting. Styles 2, filiform. Utricle included within the bracts, orbicular, compressed, its edges opposite to the bracts, not parallel, as is usual in the genus; pericarp very thin. Seed red-brown.—*Fl. Tasm.* i. 315, t. 95; *Handb. N.Z. Fl.* 232; *Benth. Fl. Austral.* v. 180. *A. crystallina*, *Hook. f. in Hook. Lond. Journ. Bot.* vi. (1847) 279. *Theleophyton Billardieri*, *Moq. in D.C. Prodr.* xiii. ii. 115.

NORTH ISLAND: On sandy beaches, rare and local. Auckland—North Cape, *Buchanan*! Takou Bay, *T. F. C.*; Whangaruru, *Colenso*; Great Barrier Island, *Omaha*, *Kirk*! between Tauranga and Maketu, *Rev. F. H. Spencer*! Anaura Bay (East Cape), *Bishop Williams*! STEWART ISLAND: Paterson's Inlet, *Petrie*! *Kirk*! CHATHAM ISLANDS: *Buchanan*. December–April.

A very remarkable species, differing from all others in the fruit being placed transversely to the bracts, not parallel. It is also found in Victoria and Tasmania.

4. **SALICORNIA**, Linn.

Annual or perennial leafless herbs, sometimes woody at the base. Stems cylindric, jointed, very succulent; branches opposite. Flowers minute, hermaphrodite or polygamous, sunk in cavities between the successive joints of the branches towards their tips, 3–7 together, free or connate at the base. Perianth obpyramidal, fleshy, flat at the top or rarely contracted; mouth 3–4-toothed. Stamens 1–2; anthers large, exserted, didymous. Ovary ovoid, narrowed above; styles 2, subulate, papillose. Utricle included in the spongy perianth, membranous, ovoid or oblong. Seed erect, oblong or obovoid; testa thinly coriaceous or crustaceous, hispid with hooked hairs; albumen wanting; embryo folded, radicle inferior.

A small genus of about 8 species, found on most temperate or tropical seashores, and occasionally in saline places inland. The single New Zealand species also occurs in Australia and Tasmania.

1. **S. australis**, *Soland. ex Forst. Prodr.* n. 489.—Stems procumbent or almost prostrate below, sometimes woody at the base, 3–12 in. long; branches numerous, jointed, ascending or erect. Joints $\frac{1}{4}$ – $\frac{1}{2}$ in. long, $\frac{1}{8}$ – $\frac{1}{5}$ in. diam., terete below, usually faintly compressed above, shortly 2-lobed at the tip, with a narrow thin and membranous margin. Spikes terminating the branches and rather thicker than them, $\frac{1}{2}$ –2 in. long, the joints short, broader than long. Flowers frequently polygamous, 5–7 together on each

side of the branch at the top of the joints, packed side by side in a cavity between the joint and the one above, forming an almost complete ring round the branch. Perianth very thick and fleshy, broad and flat and almost quadrangular at the top, narrower at the immersed base; mouth almost closed. Stamen usually one. Utricle obliquely ovoid, membranous. Seed nearly orbicular, slightly compressed; testa crustaceous, minutely hispid; embryo with thick plano-convex cotyledons and an incumbent terete radicle.—*Benth. Fl. Austral.* v. 205; *S. indica*, *R. Br. Prodr.* 411 (not of Willd.); *A. Rich. Fl. Nouv. Zel.* 182; *A. Cunn. Precur.* n. 366; *Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 216; *Handb. N.Z. Fl.* 233. *S. quinqueflora*, *Bunge. ex Ung. Sternb. Vers. Syst. Salic.* 59.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant along the shores throughout. Flowers through the summer and autumn.

5. *SUÆDA*, Forsk.

Glabrous herbs or undershrubs. Leaves alternate, fleshy, thick or terete, entire. Flowers minute, sessile or nearly so, axillary, solitary or clustered, usually hermaphrodite; bracts and bracteoles minute, scarious. Perianth short, fleshy, 5-lobed or -partite; lobes or segments equal or unequal, without appendages or more or less carinate or crested or slightly winged, enclosing the fruit. Stamens 5, short. Styles 2–5, short, subulate, recurved. Utricle included in the perianth, membranous or spongy; pericarp thin, usually free from the seed. Seed horizontal, vertical or oblique; testa crustaceous or coriaceous; albumen wanting or scanty; embryo flat, spirally rolled.

A widely distributed genus of about 40 species, usually found on sea-shores or in saline places. The single species found in New Zealand has a wide range in most temperate and tropical countries.

1. *S. maritima*, *Dum. Fl. Belg.* 22.—A much-branched glabrous erect or diffuse herb, varying in height from a few inches to nearly 2 ft.; stem often hard and almost woody at the base. Leaves sessile, $\frac{1}{4}$ – $\frac{1}{2}$ in. long or more, linear, semi-terete or almost cylindric, acute or obtuse, thick and succulent. Flowers small, greenish, solitary or 2–4 together in the axils of the leaves, each flower usually with 1 bract and 2 bracteoles. Fruiting-perianth depressed, about $\frac{1}{12}$ in. diam., 5-lobed; lobes ovate-rounded, appressed to the utricle. Utricle membranous. Seed horizontal or very rarely vertical, dark red-brown, shining.—*Raoul, Choix*, 43; *Hook. f. Fl. Nov. Zel.* i. 214; *Handb. N.Z. Fl.* 231; *Benth. Fl. Austral.* v. 206. *Chenopodium maritimum*, *Linn. Sp. Plant.* 221; *A. Rich. Fl. Nouv. Zel.* 181; *A. Cunn. Precur.* n. 364. *Salsola fruticosa*, *Forst. Prodr.* n. 131 (not of *Linn.*).

NORTH AND SOUTH ISLANDS: Not uncommon in salt marshes from the North Cape to Foveaux Strait. December–March.

The Australian and New Zealand plant is sometimes separated from the northern form under the name of *S. australis*, Moq., on account of its more suffrutescent habit, but it is very variable in this respect.

6. **SALSOLA**, Linn.

Herbs or shrubs; branches not jointed. Leaves alternate, sessile, narrow-linear or terete, often pungent. Flowers small, solitary or fascicled, axillary, hermaphrodite, 2-bracteolate. Perianth 4–5-partite; segments concave, thickened down the back, enlarged in fruit and furnished with a horizontal wing or protuberance, completely enclosing the utricle. Stamens 5, rarely fewer. Styles 2–3, subulate, erect or recurved. Utricle ovoid or orbicular; pericarp fleshy or membranous, not adherent to the seed. Seed usually horizontal, orbicular; testa membranous; albumen wanting; embryo spirally coiled.

Species estimated at about 40, widely spread in saline localities, but mainly in temperate regions.

1. **S. Kali**, Linn. *Sp. Plant.* 222.—A rigid procumbent or diffusely branched herb 6–18 in. high; stem stout, grooved and angled, scabrid-pubescent or almost glabrous; branches spreading, often striped. Leaves spreading and recurved, variable in size, $\frac{1}{4}$ –1 in. long or more, ovate-subulate with a rigid pungent point, sheathing at the base, thick and fleshy, semi-terete; the uppermost shorter and broader, almost triangular. Flowers solitary and sessile in the axils of the leaves, sometimes appearing clustered from the reduction of axillary flowering-branches, each flower with 2 opposite bracteoles; floral leaves and bracteoles all pungent. Fruiting-perianth about $\frac{1}{4}$ in. diam., shorter than the bracteoles, 5-partite; segments rigid and cartilaginous at the base, furnished above with 5 broad spreading scarious wings.—*Benth. Fl. Austral.* v. 207. *S. australis*, *R. Br. Prodr.* 411; *Hook. f. Fl. Nov. Zel.* i. 216; *Handb. N.Z. Fl.* 232.

NORTH AND SOUTH ISLANDS: Not uncommon on sandy shores from the North Cape southwards, but probably introduced. December–March.

A widely dispersed plant in most temperate and tropical regions, but of very doubtful nativity in New Zealand. It is a true native of Australia, however.

ORDER LXV. **POLYGONACEÆ.**

Herbs or shrubs or woody climbers. Leaves alternate or rarely opposite, simple, entire or serrulate. Stipules thin, scarious or membranous, forming a sheath round the stem. Flowers small, regular, usually hermaphrodite, herbaceous or coloured, often jointed on the pedicel, clustered in the axils of the leaves or in

spikes or racemes, often forming terminal panicles. Perianth inferior, persistent; segments 3-6, free or connate at the base, imbricate. Stamens 5-9, rarely more or less, hypogynous or perigynous; filaments capillary or subulate, free or connate at the base; anthers 2-celled. Ovary superior, compressed or 3-gonous; styles 1-3; ovule solitary, basal, orthotropous. Fruit a small hard indehiscent trigonous or compressed nut, usually enclosed in the persistent perianth. Seed erect, testa membranous; albumen copious, farinaceous; embryo variable in position, radicle superior.

A rather large order, spread over the whole world, but most abundant in the north temperate zone. Genera 30; species over 600. The roots of many species are nauseous and purgative, the medicinal rhubarb being a well-known instance. On the other hand, the stems and leaves are frequently acid and refreshing, as the garden-rhubarb and the common sorrel. Buckwheat (*Fagopyrum*) is the only edible plant of any consequence. Of the 3 New Zealand genera, *Muehlenbeckia* extends to Australia and South America; the remaining 2 are widely distributed in both hemispheres.

Flowers hermaphrodite. Perianth-segments 5, not succulent in fruit	1. POLYGONUM.
Flowers hermaphrodite. Perianth-segments 6, the 3 inner enlarging and closing over the fruit, not succulent ..	2. RUMEX.
Flowers unisexual. Perianth-segments 5, enlarged and succulent in fruit	3. MUEHLENBECKIA.

1. POLYGONUM, Linn.

Herbs, rarely shrubby at the base. Leaves alternate; stipules membranous, usually tubular and closely sheathing the stem. Flowers small, hermaphrodite, clustered; clusters either axillary or in racemes or spikes or panicles; bracts and bracteoles membranous, ochreate; pedicels usually jointed. Perianth 5-partite, green or coloured; segments equal or the 2 or 3 outer ones the largest. Stamens 5-8. Ovary compressed or 3-gonous; styles 2 or 3, free or connate at the base; stigmas usually capitellate. Nuts compressed or 3-gonous, included in the persistent perianth. Seed albuminous; embryo excentric or lateral; radicle long, superior.

A large and almost cosmopolitan genus, including over 150 species. The three found in New Zealand are all widely distributed.

* Stems prostrate. Flowers in axillary clusters.

Stems long, wiry, sparingly branched. Perianth $\frac{1}{8}$ in. long.	
Nut minutely striate or punctate	1. <i>P. aviculare</i> .
Stems short, compactly branched. Perianth $\frac{1}{12}$ in. long.	
Nut smooth and polished	2. <i>P. plebeium</i> .

** Stems erect or ascending above. Flowers in slender terminal spikes.

Leaves 2-5 in., lanceolate. Stipules ciliate and pilose.	
Spikes very slender, 1-2 in. long	3. <i>P. serrulatum</i> .

For references to several introduced species of *Polygonum*, see the list of naturalised plants appended to this work.

1. *P. aviculare*, Linn. *Sp. Plant.* 362.—A glabrous rigid and wiry prostrate annual, much branched from the base; branches $\frac{1}{2}$ –2 ft. long, straggling, grooved, leafy throughout. Leaves scattered, sessile or shortly petioled, $\frac{1}{3}$ –1 in. long or more, linear-oblong to lanceolate or linear-lanceolate, rarely broader and elliptic-oblong, acute or obtuse, veins indistinct beneath, margins flat or recurved; stipules brown or reddish near the base, silvery-white above, scarious, lacerate to below the middle. Flowers small, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, solitary or in clusters of 2–4 in the axils of nearly all the leaves, very shortly pedicelled. Perianth-segments oblong, obtuse, with a green centre and broad white margins. Nut ovoid, obtusely 3-gonous, very minutely striate or punctate.—*Hook. f. Fl. Nov. Zel.* i. 210; *Handb. N.Z. Fl.* 235; *Benth. Fl. Austral.* v. 267.

NORTH AND SOUTH ISLANDS: Roadsides and waste places from the North Cape to Foveaux Strait. Most probably an immigrant. Sea-level to 2500 ft. Knot-grass; Makakaka. November–March.

It is highly doubtful if this is indigenous anywhere outside Europe and northern Asia, although its present distribution is almost cosmopolitan. So far as its occurrence in New Zealand is concerned, I should certainly have relegated it to the list of naturalised plants had it not been for the positive opinion expressed in favour of its nativity by the late Mr. Kirk. Those interested in the subject should read the papers by Kirk and Travers printed in Vols. iv. and v. of the Trans. N.Z. Institute.

2. *P. plebeium*, R. Br. *Prodr.* 420.—Habit of *P. aviculare*, but smaller and more compactly branched. Stems prostrate, glabrous or minutely scaberulous, 4–12 in. long, rarely more; branches slender, grooved. Leaves more closely placed than in *P. aviculare*, $\frac{1}{6}$ – $\frac{1}{2}$ in. long, linear to linear-oblong, rarely linear-spathulate, obtuse or subacute, midrib evident, margins flat or recurved; stipules short, hyaline, lacerate to the middle. Flowers small, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, solitary or in clusters of 2–5 in the axils of most of the leaves; pedicels short. Nut smaller than in *P. aviculare*, rhomboid, obtusely 3-gonous, smooth and shining.—*Benth. Fl. Austral.* v. 267. *P. Dryandri*, *Spreng. Syst.* ii. 255; *Hook. f. Fl. Nov. Zel.* i. 210. *P. aviculare* var. *Dryandri*, *Hook. f. Handb. N.Z. Fl.* 236.

NORTH AND SOUTH ISLANDS: From the Great Barrier Island and the East Cape southwards to the Bluff, but local in the North Island, most abundant in Canterbury and Otago. Sea-level to 3000 ft. November–March.

Very closely allied to *P. aviculare*, but apparently sufficiently distinct in the smaller size and more compact habit, smaller flowers, and smaller shining and polished nut. A common plant in Australia, tropical Asia, and some parts of Africa.

3. *P. serrulatum*, Lag. *Gen. et Sp. Nov.* 14.—Stems slender, herbaceous, sparingly branched, prostrate and rooting below, ascending or erect above, glabrous, 9–24 in. long or more. Leaves shortly petiolate, 2–5 in. long, lanceolate or linear-lanceolate,

acuminate, narrowed to a rounded or subcordate base, membranous, glabrous or strigose on the midrib beneath, margins serrulate; stipules long, closely sheathing, ciliate and pilose with long erect hairs. Spikes terminal, very slender, simple or sparingly branched, 1-2 in. long; bracts narrow-turbinate, truncate, margins ciliate. Flowers 2-3 to each bract, small, reddish, $\frac{1}{2}$ in. long. Perianth-segments oblong, obtuse, glabrous and eglandular. Stamens 5 or 6. Style-branches 2, rarely 3. Nut plano-convex with obtuse margins, rarely trigonous, smooth and shining.—*P. minus* var. *decipiens*, Hook. f. *Handb. N.Z. Fl.* 235. *P. prostratum*, A. Rich. *Fl. Nov. Zel.* 177 (not of R. Br.); A. Cunn. *Precur.* n. 358; Raoul, *Choix*, 42; Hook. f. *Fl. Nov. Zel.* i. 209.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant along the sides of rivers or in lowland swamps from the North Cape to Canterbury. *Tutunawai*. November-March.

A widely distributed plant, ranging through south Europe, western Asia, Africa, and Australia. It differs from *P. minus* in the larger size, the more slender and much more erect habit, and in the longer and more ciliate stipules.

2. RUMEX, Linn.

Perennial or annual herbs, very rarely shrubby. Leaves all radical or radical and cauline, often cordate or hastate at the base, entire or toothed or almost pinnatifid. Flowers hermaphrodite or less commonly unisexual, small, green, in axillary clusters or whorls, often forming simple or paniced racemes. Perianth-segments 6, the 3 inner enlarging and closing over the fruit, margins entire or toothed, midrib often tubercled. Stamens 6. Ovary 3-gonous; styles short, filiform; stigmas fimbriate. Nut 3-gonous, included in the enlarged inner perianth-segments, angles acute. Embryo lateral.

A large genus of over 100 species, found in all temperate and many tropical countries, and including several common weeds of cultivation. Both the New Zealand species are endemic.

Flowering-stems much divaricately branched, 6-18 in. high. Inner perianth-segments without tubercles, reticulate, margins usually with long curved spines ..

1. *R. flexuosus*.

Flowering-stems short, stout, depressed, 2-6 in. high.

Inner perianth-segments tubercled; margins entire or with 1 or 2 short teeth

2. *R. neglectus*.

Several species of *Rumex* from the Northern Hemisphere have been introduced into the colony, and are now widely diffused, the most abundant being the English "docks" *R. obtusifolius*, *R. crispus*, and *R. viridis*; and the "sheeps' sorrel" *R. acetosella*. Descriptions of these will be found in any English Flora.

1. *R. flexuosus*, Sol. ex Forst. *Prodr.* n. 515.—A glabrous perennial herb with a diffusely branched stem 6-18 in. high; branches slender, grooved, flexuous, divaricate. Leaves chiefly

radical, variable in size, 3–12 in. long, linear or linear-oblong, acute or obtuse, cuneate or truncate or cordate at the base, rarely expanded or subhastate; margins flat or waved. Panicle at first open, but in an advanced fruiting stage the branches are often numerous, spreading and intricate; whorls remote, 4–12-flowered, the lower ones leafy; peduncles jointed near the base, curved, deflexed. Inner segments of the fruiting-perianth about $\frac{1}{10}$ in. long, rhomboid, narrowed into a long acuminate tip, reticulated, without tubercles; margins entire or more usually furnished with 1–4 hooked spines on each side.—*Hook. f. Fl. Nov. Zel. i. 211; Handb. N.Z. Fl. 237.* A. Cunninghamii, *Meissn. in D.C. Prodr. xiv. 62.* R. Brownianus, *A. Cunn. Precur. n. 360 (not of Camp.); Raoul, Choix, 42.*

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant throughout. Sea-level to 4000 ft. December–March.

Very closely allied to the Australian *R. Brownii*, to which it was referred by Allan Cunningham, and from which it differs mainly in the more diffusely branched habit.

2. *R. neglectus*, *T. Kirk in Trans. N.Z. Inst. ix. (1877) 493.*—A glabrous perennial herb 2–6 in. high; rootstock long, stout, often branched above. Leaves rosulate, 1–3 in. long, linear-oblong, obtuse, truncate or cuneate at the base, margins crenate-undulate; petiole almost as long as the blade. Flowering-stem short, stout, depressed, simple or with 1–2 branches from the base; dense-flowered or rarely elongated with the whorls interrupted; peduncles usually deflexed. Flowers hermaphrodite. Fruiting-perianth subcampanulate, about $\frac{1}{8}$ in. long, thickened at the base; outer segments oblong, obtuse, equalling the tube; inner rather longer, lanceolate, acute, with a tubercle on the midrib and 1 or 2 short teeth on each side.—*Oliver in Hook. Ic. Plant. t. 1245.* *R. cuneifolius var. alismæfolius, Hook. f. Fl. Antarct. i. 67.*

NORTH ISLAND: Pebbly beaches near Wellington, *Kirk!* SOUTH ISLAND: Canterbury—*Armstrong.* Otago—Dusky Bay, *Buchanan!* Port Molyneux, Catlin River, the Bluff, *Petrie!* STEWART ISLAND: Paterson's Inlet, *Petrie!* AUCKLAND ISLANDS: *Sir J. D. Hooker, Kirk!* November–March.

3. MUEHLENBECKIA, Meissn.

Large or small shrubs or undershrubs, often climbing, sometimes prostrate or diffusely spreading. Leaves alternate, petiolate, large or small, sometimes wanting; stipules short, loosely sheathing. Flowers polygamous or diœcious, small, whitish, fascicled within small sheathing bracts; fascicles axillary or arranged in axillary or terminal spikes, racemes, or panicles. Perianth deeply 5-partite; segments equal or the outer ones rather larger, often becoming white and succulent in fruit. Stamens 8, rarely fewer, affixed to the base of the perianth; filaments filiform; anthers

ovate, in the female flowers reduced to short and thick staminodia or altogether wanting. Ovary 3-gonous, in the male flowers small and rudimentary; styles 3, short; stigmas usually fimbriate. Nut obtusely or acutely 3-gonous, enclosed in the usually more or less succulent perianth.

A small genus of about 15 species, found in Australia, New Zealand, the Pacific islands, and extra-tropical and Andine South America. Of the four species described below, one is found in Australia and another in Norfolk Island, the remaining two are endemic.

Leaves 1-3 in., broad-ovate, acuminate, membranous.

Flowers in much-branched panicles 1. *M. australis*.

Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., broadly oblong or orbicular. Flowers in spikes, rarely paniced 2. *M. complexa*.

Leaves $\frac{1}{10}$ - $\frac{1}{3}$ in., ovate-oblong or orbicular. Flowers axillary, solitary or 2 together 3. *M. axillaris*.

Leaves wanting or if present linear. Male flowers in lax spikes; females in few-flowered fascicles 4. *M. ephedrioides*.

1. *M. australis*, *Meissn. Gen. Comm.* 227.—A much-branched climber, covering shrubs or small trees, or trailing over cliffs or rocks; trunk stout, woody, sometimes 3 in. diam.; bark greyish; branches numerous, flexuous and interlaced, the younger ones grooved and angled, glabrous or faintly scaberulous. Leaves petiolate, 1-3 in. long, ovate or orbicular-oblong, apiculate or acuminate, rarely obtuse, cordate or truncate at the base, thin and membranous, quite glabrous, usually entire, but sometimes panduriform or 3-lobed, margins undulate-cripsed; petioles $\frac{1}{3}$ -1 in. long; stipules deciduous. Panicles large, axillary and terminal, much branched, $1\frac{1}{2}$ -3 in. long or more. Flowers about $\frac{1}{6}$ in. diam., greenish, dioecious; males with 8 stamens and the rudiment of an ovary; females with 8 blunt staminodia and a short triquetrous ovary; stigmas broad, fimbriate. Fruiting-perianth closed over the fruit, slightly succulent or almost herbaceous. Nut black, shining, 3-angled and 3-grooved, angles often twisted.—*M. adpressa*, *Hook. f. Handb. N.Z. Fl.* 236 (not of *Meissn*). *Polygonum australe*, *A. Rich. Fl. Nouv. Zel.* 178; *A. Cunn. Precur.* n. 355; *Raoul, Choix*, 42. *P. adpressum*, *A. Cunn. l.c.* n. 356 (not of *Labill.*). *Coccoloba australis*, *Forst. Prodr.* n. 176.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Common from the Three Kings Islands and the North Cape southwards. Sea-level to 2000 ft. November-April.

Also found in Norfolk Island, and very closely allied to the Australian *M. adpressa*, *Meissn*.

2. *M. complexa*, *Meissn. Gen. Comm.* 227.—Forming dense thick and elastic prostrate masses many feet in diam., or climbing over bushes or rocks. Stems slender, tough and woody, much interlaced; branches very numerous, flexuous, terete, the ultimate ones pubescent with short stiff hairs; bark dark red-brown.

Leaves petiolate, exceedingly variable in size and shape, even on the same plant, $\frac{1}{5}$ – $\frac{3}{4}$ in. long or more, broadly oblong or obovate or orbicular, rounded or retuse at the tip, rarely subacute, cordate or truncate or rounded at the base, often contracted in the middle, sometimes 3-lobed, quite smooth, glabrous or the petiole puberulous, coriaceous or almost membranous, margins even, entire; stipules deciduous. Spikes axillary and terminal, long or short, simple or compound, glabrous or puberulous, sometimes reduced to 2 or 3 flowers, at other times forming a panicle 1–1 $\frac{1}{2}$ in. long or more. Flowers small, dioecious. Stamens 8. Stigmas very broad, fimbriate. Fruiting-perianth much enlarged, often $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., succulent, waxy-white, forming a fleshy cup surrounding the fruit, in some varieties unaltered and herbaceous. Nut black, shining, deeply triquetrous.—*Hook. f. Handb. N.Z. Fl.* 236. *M. microphylla*, *Col. in Trans. N.Z. Inst.* xx. (1888) 204. *M. paucifolia*, *M. trilobata*, and *M. truncata*, *Col. l.c.* xxi. (1889) 99–101. *Polygonum com-plexum*, *A. Cunn. Precur.* n. 357; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 210.

NORTH AND SOUTH ISLANDS: Abundant throughout, ascending to 2000 ft. *Pohuehue*. November–April.

Varying much in the size and shape of the leaves, the degree of development of the spikes, and the extent to which the perianth enlarges and becomes fleshy in fruit. Mr. Colenso made no less than 4 species, based mainly on variations in the above characters, but his own specimens show how inconstant these distinctions are, and how little they can be relied upon.

3. *M. axillaris*, *Walp. Ann.* i. 552.—A small much-branched prostrate or diffuse shrubby plant, usually forming densely matted patches 3–12 in. diam., but sometimes open and straggling; stems and branches woody; branchlets puberulous. Leaves on rather long petioles, small, $\frac{1}{10}$ – $\frac{1}{3}$ in. long, broadly oblong or ovate-oblong or almost orbicular, obtuse or retuse, rounded at the base, flat, quite glabrous, dotted beneath. Flowers small, solitary or 2 together in the axils of the leaves, or the males rarely forming short few-flowered spikes at the ends of the branchlets; pedicels slender. Stigmas fimbriate. Perianth succulent in fruit or almost unaltered. Nut triquetrous with obtuse angles, black, smooth and shining, rather longer than the perianth.—*Hook. f. Handb. N.Z. Fl.* 236; *Benth. Fl. Austral.* v. 275. *M. hypogæa*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 98. *Polygonum axillare*, *Hook. f. Fl. Nov. Zel.* i. 211.

NORTH ISLAND: Mountain districts in the interior, from Taupo and the East Cape southwards. SOUTH ISLAND: Common in mountain districts throughout. Sea-level to 4500 ft. December–March.

Also found in Tasmania and Australia, and reported from Lord Howe Island.

4. *M. ephedrioides*, *Hook. f. Fl. Nov. Zel.* i. 211.—A much-branched prostrate shrub; stems 9–36 in. long or more, rigid and wiry, deeply grooved, leafless and rush-like or sparingly leafy;

branchlets often scaberulous. Leaves when present few and scattered, petiolate or almost sessile, $\frac{1}{8}$ –1 in. long, linear or linear-lanceolate, often dilated or almost hastate at the base, acute or obtuse, glabrous, sometimes scaberulous on the midrib beneath; stipules short, obliquely truncate. Flowers small, polygamous; those on the male plant in lax axillary simple or branched glabrous spikes, often with a few female flowers intermixed; on the female plant in few-flowered fascicles or short dense spikes, usually with 1 or two male flowers mixed with the females. Stigmas fimbriate. Perianth succulent or remaining unaltered in fruit. Nut exceeding the perianth, black, smooth and shining, triquetrous with the angles obtuse.—*Handb. N.Z. Fl.* 237.

Var. **muricata**.—Smaller and much more slender, branchlets often almost filiform. Leaves usually present, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, linear. Perianth-segments membranous in fruit.—*M. muricata*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 482 (perhaps a distinct species).

NORTH ISLAND: Hawke's Bay—Near the sea, *Colenso*! *A. Hamilton*! Upper Rangitikei, *Bishop Williams*, *Petrie*! SOUTH ISLAND: Marlborough—Near Blenheim, *Buchanan*! *Kirk*! Canterbury—Waipara, *Haast*! Otago—Lower Waitaki, *Hector* and *Buchanan*; Kurow, Awamoko, Roxburgh, *Petrie*! Var. *muricata*: North Island—Lake Taupo, *Tryon*! Ruapehu, *H. Hill*! Waipawa, *A. Hamilton*! Sea-level to 3000 ft. December–March.

Easily recognised by the prostrate rush-like stems, which are often entirely leafless.

ORDER LXVI. PIPERACEÆ.

Herbs or shrubs, often aromatic and stimulating. Leaves alternate or opposite or whorled, simple, entire; stipules wanting, or 2 connate, or adnate to the petiole. Flowers minute, hermaphrodite or unisexual, crowded on axillary or terminal catkin-like spikes, each subtended by a sessile or stipitate bract. Perianth wanting. Stamens 2 or more, hypogynous; filaments very short; anthers often jointed on the filaments, cells 2 or confluent. Ovary (except in the tribe *Saurureæ*, which does not occur in New Zealand) 1-celled, with a single orthotropous ovule; style wanting or very short; stigmas 1–6, various in shape. Fruit a small indehiscent berry. Seed solitary, globose or ovoid or oblong; albumen copious, farinaceous; embryo very minute, enclosed in a sac at the apex of the seed.

A large order, with some trifling exceptions confined to tropical and sub-tropical regions, and far more abundant in tropical America than anywhere else. Genera 8; species given at 1000, but probably overestimated. Aromatic and stimulating properties prevail through the greater part of the order. The common pepper has been used as a spice since the times of Alexander, and other species of *Piper* can be similarly employed. The use of the betel (*Piper betel*) as a masticatory is well known, also that of the kava (*Piper methysticum*) to prepare an intoxicating drink. The two New Zealand genera are the largest in the order, and have the widest range.

Usually shrubby. Anther-cells 2, distinct. Stigmas 2-4 1. PIPER.

Small fleshy herbs. Anther-cells confluent. Stigmas

usually penicillate. Fruit very small 2. PEPEROMIA.

1. PIPER, Linn.

Shrubs or rarely small trees or tall herbs; branches often jointed and swollen at the nodes. Leaves alternate, entire, equal or unequal at the base; stipules often adnate to the petiole. Spikes slender, solitary and leaf-opposed, or solitary or 2-3 together in the axils, sometimes umbelled on a common peduncle. Flowers dioecious or hermaphrodite, minute, closely packed, each one situated in the axil of a peltate or cupular or adnate bract, with or without lateral bracteoles. Perianth wanting. Stamens 1-4; filaments short; anthers 2-celled, the cells often placed back to back, longitudinally dehiscent. Ovary sessile, 1-celled; stigmas 2-5, distinct; ovule solitary, erect. Berry small, ovoid or globose. Seed with a membranous testa; albumen hard.

One of the largest genera of the vegetable kingdom, containing more than 500 described species; found in all tropical countries, and specially plentiful in tropical South America.

1. *P. excelsum*, Forst. Prodr. n. 20.—An aromatic perfectly glabrous densely branched shrub or small tree 8-20 ft. high; branches smooth, flexuose, jointed and swollen at the nodes. Leaves petiolate, 2-5 in. long including the petiole, orbicular-cordate or broadly ovate, shortly acuminate, cordate at the base or sometimes truncate or rounded, 7-nerved from the base, smooth and glabrous on both surfaces, yellowish-green; petioles $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, lower portion broadly winged on each side by the adnate stipules. Spikes unisexual, solitary or binate, terminating short peduncles or branchlets springing from the axils of the leaves, slender, strict, erect, 1-3 in. long. Flowers minute, very densely packed, the bract orbicular-peltate, sessile. Stamens 2 or rarely 3. Stigmas 3 or rarely 4. Berries densely compacted, small, yellow, broadly obovoid, angled, succulent.—*A. Rich. Fl. Nov. Zel.* 356; *A. Cunn. Precur. n.* 323; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel. i.* 228; *Handb. N.Z. Fl.* 254; *Benth. Fl. Austral. vi.* 204. *Macropiper excelsum*, *Miq. Syst. Pip.* 221; *F. Muell. Veg. Chath. Is.* 48.

Var. *major*.—Leaves larger, 4-8 in. long, usually 9-nerved. Spikes longer, sometimes 6 in. Approaches *P. latifolium*, Forst.

KERMADEC ISLANDS: Var. *major* abundant, *McGillivray, T. F. C.* NORTH ISLAND: Var. *major* plentiful on the Three Kings Islands, the ordinary form common from thence southwards. SOUTH ISLAND: In lowland districts from Nelson and Marlborough to Banks Peninsula and Okarito, usually near the coast. CHATHAM ISLANDS: Not uncommon, *Travers! Cox! Kawakawa.* Flowers most of the year.

Plentiful in Norfolk Island and Lord Howe Island, also recorded from Tahiti and others of the Pacific islands. The fruit and leaves are aromatic and stimulating, and a decoction of the latter has been used for toothache.

2. **PEPEROMIA**, Ruiz and Pavon.

Annual or perennial herbs, usually succulent. Leaves alternate or opposite or whorled, fleshy or more rarely membranous, often pellucid-dotted; stipules wanting. Spikes slender, terminal or axillary or leaf-opposed, solitary or fascicled. Flowers hermaphrodite, minute, sessile or sunk in the rhachis of the spike, bracteate; the bract frequently peltate. Perianth wanting. Stamens 2; filaments very short; anther-cells confluent. Ovary sessile, obtuse or acute, 1-celled; stigma usually penicillate; ovule solitary, erect. Fruit minute, indehiscent; seed with a membranous testa.

A large genus of about 400 species, widely spread in almost all tropical regions, but most plentiful in South America.

Leaves in whorls of 4, coriaceous when dry.	Spikes terminal	..	1. <i>P. reflexa</i> .
Leaves alternate, thin and membranous	when dry.	..	
Spikes terminal and axillary	..	..	2. <i>P. Endlicheri</i> .

1. ***P. reflexa***, *A. Dietr. Sp. Plant.* i. 180.—Small, succulent, erect or spreading, much branched from the base, 4–9 in. high; branches deeply grooved when dry, pubescent at the nodes. Leaves in whorls of 3 or 4, rarely opposite, shortly petiolate or almost sessile, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, elliptic-rhomboidal or almost orbicular, obtuse, fleshy when fresh, coriaceous when dry, dark-green above, paler beneath, minutely punctate, young leaves beneath and petioles finely pubescent, veins obscure. Spikes slender, terminal, pedunculate, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, dense-flowered; peduncle and rhachis pubescent. Bract orbicular-peltate, almost sessile. Ovary partly immersed in the rhachis, ovate, acute; stigma capitellate. Berry exserted, ovoid, reddish, $\frac{1}{20}$ in. long.—*Benth. Fl. Austral.* vi. 206. *P. novæ-zealandiæ*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 394. *Piper æmulum*, *Endl. Prodr. Fl. Norfl.* 36.

NORTH ISLAND: Woods near the East Cape, *H. Hill*!

I have only seen indifferent specimens of this, but there can be no doubt of its identity with *P. reflexa*, a plant found in most tropical countries, and which is common in some parts of Australia, also in Lord Howe Island and Norfolk Island.

2. ***P. Endlicheri***, *Miq. Syst. Pip.* 102.—A small glabrous succulent herb 6–12 in. high; stems sparingly branched, prostrate and rooting at the base, ascending or erect above. Leaves alternate, shortly petiolate, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, broadly obovate or elliptic-oblong, sometimes almost orbicular, rounded at the tip or rarely subacute, 3-nerved at the base, glabrous, very thick and fleshy when fresh, thin and often almost pellucid when dry. Spikes terminal and axillary, solitary, peduncled, 1–2 in. long. Bract orbicular-peltate. Ovary partly immersed; stigma discoid. Berry exserted or im-

mersed at the base.—*P. Urvilleana*, *A. Rich. Fl. Nouv. Zel.* 356; *A. Cunn. Precur.* n. 324; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 228; *Handb. N.Z. Fl.* 254. *Piper simplex*, *Endl. Prodr. Fl. Norfl.* 37.

KERMADEC ISLANDS, NORTH ISLAND: On rocks and trees in damp shady places as far south as Taranaki and the northern portion of the Wellington Province. Flowers most of the year.

Also found in Norfolk Island and Lord Howe Island. I suspect that Colenso's *P. muricatulata* (*Trans. N.Z. Inst.* xxvii. (1895) 393) is a large-leaved state, but there are no specimens in his herbarium, and it is impossible to be sure from the description alone.

ORDER LVII. CHLORANTHACEÆ.

Shrubs or trees, rarely herbs, generally aromatic. Leaves opposite, usually toothed, petioles often connate at the base; stipules small, subulate. Flowers small, unisexual, in terminal or axillary spikes or panicles. Perianth wanting (rarely present in the female flowers). Stamens either 1 or 3 connate; filaments short and thick; anthers 2-celled, or when there are 3 the lateral 1-celled. Ovary 1-celled; stigma either sessile or style very short; ovule solitary, orthotropous, pendulous from the top of the cell. Fruit a small globose or ovoid drupe. Seed pendulous; testa membranous; albumen copious, fleshy; embryo minute, remote from the hilum, radicle inferior.

A small and unimportant order, comprising 3 genera and 25 species, mostly tropical or subtropical.

1. ASCARINA, Forst.

Aromatic shrubs or small trees; branchlets jointed at the nodes. Leaves opposite, serrate, penniveined; petioles connate at the base into a short sheath; stipules small, subulate. Flowers minute, diœcious, arranged in simple or branched spikes. Perianth wanting in both sexes. Male flowers: Stamen solitary; anther sessile, linear-oblong, cylindric, 2-celled; cells parallel, dehiscing longitudinally. Female flowers: Ovary naked, ovoid or subglobose; stigma sessile, truncate. Drupe small, putamen fragile.

A small genus of three species, all very closely allied, found in New Zealand and the Pacific islands from New Caledonia eastwards to Tahiti.

Leaves 2-4 in., ovate- or oblong-lanceolate, acuminate.

Anthers $\frac{1}{2}$ in. long 1. *A. lanceolata*.

Leaves 1-2 in., elliptic-oblong or obovate-oblong, obtuse

or acute. Anthers $\frac{1}{10}$ in. long 2. *A. lucida*.

1. *A. lanceolata*, *Hook. f. in Journ. Linn. Soc.* (1856) 127.—A perfectly glabrous bushy shrub or small tree 6-15 ft. high, rarely more; branches dark purplish-red, striate when dry. Leaves 2-4 in. long including the petiole, ovate-lanceolate or oblong-lanceo-

late, acuminate, narrowed into the petiole, dark-green and glossy above, paler beneath; margins coarsely serrate, the teeth often curved and acute; petioles $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Spikes closely branched in a racemiform manner, 1–2 in. long; branches opposite, springing from the axils of a pair of connate bracts. Male flowers alone seen, rather closely placed, each one in the axil of a broadly ovate acute bract, and with a smaller bracteole on each side. Anther sessile, $\frac{1}{8}$ in. long, linear-oblong, cylindric; connective thick, produced at the tip into a minute usually recurved apiculus.

KERMADEC ISLANDS: Sunday Island, not uncommon on the hills, *McGillivray*, *T. F. C.* August–September.

This was reduced to *A. lucida* in the Handbook, but appears to be sufficiently distinct in the larger and narrower more acuminate leaves, and larger anthers. The same species, or a very close ally, is found in Fiji, Samoa, and Rarotonga.

2. *A. lucida*, *Hook. f. Fl. Nov. Zel.* i. 228.—A perfectly glabrous closely branched shrub or small tree 10–25 ft. high, with a trunk 6–12 in. diam.; branches slender, terete, striate when dry, dark purplish-red. Leaves 1–2 in. long including the petiole, obovate-oblong to elliptic-oblong or linear-oblong, obtuse or acute, cuneate at the base, dark-green and glossy above, often glaucous beneath, margins coarsely and often obtusely serrate; petioles $\frac{1}{8}$ in. long. Spikes laxly branched in a racemiform manner, the females more slender and more sparingly divided than the males; branches opposite, pendulous. Flowers minute, alternate, each one in the axil of a broadly ovate acute bract with a smaller bracteole on each side. Anther sessile, oblong, $\frac{1}{10}$ in. long. Female flowers sometimes 2 or 3 together. Ovary broadly ovoid; stigma very broad, truncate. Ripe fruit not seen.—*Handb. N.Z. Fl.* 253. *A. rubricaulis*, *Solms in D.C. Prodr.* xvi. 1, 478 (*in part*).

NORTH ISLAND: Auckland—Hokianga, *Buchanan*; Bay of Islands, *Kirk*; Whangarei, *H. Carse*, *T. F. C.*; Little Barrier Island, *T. F. C.*; Coromandel, *Petrie*; Waitakerei Ranges, *T. F. C.*; near Waihi, *Petrie*; Taranaki—Mount Egmont, *Buchanan*. Wellington—Wairarapa Valley, *Colenso*! SOUTH ISLAND: Marlborough—Queen Charlotte Sound, *Banks* and *Solander*; Keneperu, *J. Rutland*! Nelson—Cape Foulwind, *W. Townson*! Westland—*R. Helms*. Otago—Common in the sounds of the south-west coast, *Hector*! Preservation Inlet, *Kirk*! STEWART ISLAND: *C. Traill*. Sea-level to 2500 ft. September–November.

Although this extends through almost the whole length of the colony it is remarkably local, rarely occurring in any quantity. It is perhaps more abundant in the south-west of Otago than in any other locality.

ORDER LXVIII. MONIMIACEÆ.

Trees or shrubs, often aromatic. Leaves opposite, rarely alternate, simple; stipules wanting. Flowers regular, hermaphrodite or unisexual, usually in short cymes or racemes. Perianth inferior,

globose, hemispherical or subcampanulate, limb 4–15-toothed. Stamens usually indefinite, in one or many series on a disc lining the perianth-tube, all fertile or some reduced to staminodia; filaments short; anthers 2-celled, opening by slits or valves. Carpels usually many, rarely solitary, free, sessile on the base or sides of the perianth-tube, 1-celled; style long or short; stigma small; ovule solitary, erect or pendulous. Fruit of several (rarely only one) drupes or achenes, resting on the expanded receptacle or enclosed within the enlarged perianth. Seed solitary, testa membranous; albumen fleshy; embryo variable, radicle inferior or superior.

A small order, best represented in tropical South America, but also found in tropical Asia, the Mascarene Islands, Australia, and Polynesia. Genera 22; species estimated at 150. Of the 2 New Zealand genera, *Hedycarya* is found in Australasia and the Pacific islands, while *Laurelia* is confined to South America and New Zealand.

Anthers opening by longitudinal slits. Ovule pendulous.

Drupes stipitate 1. HEDYCARYA.

Anthers opening by ascending valves. Ovule erect.

Achenes with plumose styles 2. LAURELIA.

1. HEDYCARYA, Forst.

Small trees or shrubs. Leaves opposite, entire or toothed. Flowers diœcious, in axillary cymes or racemes. Male flowers: Perianth broad, cup-shaped; segments 5–10, inflexed, more or less connate at the base. Stamens numerous, covering almost the whole of the disc; filaments very short or almost wanting; anthers 2-celled, dehiscing by introrse or lateral slits. Female flowers: Perianth similar to that of the males, but rather smaller. Staminodia wanting. Carpels numerous, covering the whole disc, sessile, terminated by a thick conical style; ovule pendulous, anatropous. Fruit of few or several drupes crowded on the top of the disc-shaped receptacle. Seed pendulous; albumen copious; embryo axile, radicle superior.

A genus of 8 or 10 species, one of which is endemic in New Zealand, and another in Australia, the remainder being natives of New Caledonia, Fiji, Samoa, and Tonga.

1. *H. arborea*, Forst. *Char. Gen.* 128, t. 64.—A small tree 20–40 ft. high with a trunk 9–20 in. diam. or more; bark dark-brown; branches ascending, pubescent at the tips. Leaves opposite, petiolate, 2–5 in. long including the petiole, linear-oblong to obovate-oblong or obovate, acute or obtuse, distantly coarsely serrate or rarely entire, coriaceous, dark-green above, paler beneath, glabrous or more or less pubescent, especially on the petiole and midrib beneath. Racemes axillary, often corymbosely branched, shorter than the leaves; pedicels variable in length, pubescent.

Male perianth $\frac{1}{3}$ – $\frac{1}{2}$ in. diam., saucer-shaped, pubescent. Stamens very numerous; anthers sessile, pubescent along the back. Female perianth $\frac{1}{4}$ in. across. Carpels 8–20. Drupes 4–10, crowded, stipitate, $\frac{1}{2}$ in. long, oblong, obtuse, bright-red, succulent; endocarp hard, crustaceous.—*H. dentata*, *Forst. Prodr.* n. 379; *A. Rich. Fl. Nouv. Zel.* 354; *A. Cunn. Precur.* n. 336; *Raoul, Choix*, 30, t. 30; *Hook. f. Fl. Nov. Zel.* i. 219; *Handb. N.Z. Fl.* 240; *Kirk, Forest Fl.* t. 110. *H. scabra*, *A. Cunn. Precur.* n. 337. *Zanthoxylum novæ-zealandiæ*, *A. Rich. Fl. Nouv. Zel.* 291, t. 33.

NORTH AND SOUTH ISLANDS: Abundant in woods from the Three Kings Islands and the North Cape to Banks Peninsula and Milford Sound. Sea-level to 2500 ft. *Porokaiwhiri*. October–November.

The specific name *arborea* was applied in J. and G. Forster's "Characteres Generum," published in 1776, and must therefore take precedence over that of *dentata*, published by G. Forster in the "Prodromus" in 1786.

2. LAURELIA, Juss.

Tall aromatic forest-trees. Leaves opposite, coriaceous. Flowers dioecious or polygamous, in axillary cymes or racemes. Male flowers: Perianth-tube short, campanulate; lobes 5–12, in 2 or 3 series, subequal or the outer shorter. Stamens 6–12; filaments short, 2-glandular at the base; anthers 2-celled, opening by 2 up-turned valves. Female flowers (or hermaphrodite): Perianth elongating after fertilisation, narrow-urceolate or tubular, ultimately 3–5-cleft. Stamens reduced to scales, or the outer series alone perfect. Carpels numerous, fusiform, pilose, narrowed into long plumose styles; ovule solitary, erect, anatropous. Achenes small, densely pilose, included in the enlarged perianth. Seed albuminous; embryo small, radicle inferior.

Besides the New Zealand species, which is endemic, there is a second found in Chili. The genus is very closely allied to the Australian *Atherosperma*, which principally differs in the flowers being seated within 2 cymbiform bracts.

1. *L. novæ-zealandiæ*, *A. Cunn. Precur.* n. 354.—A tall forest-tree, often attaining a height of 80 to 100 or even 120 ft.; trunk 4–6 ft. diam., usually with radiating buttresses at the base; bark pale, almost white; branchlets opposite, tetragonous, the younger ones faintly pubescent. Leaves opposite, petiolate, $1\frac{1}{2}$ –3 in. long, oblong or elliptic-oblong or obovate, obtuse, cuneate at the base, coarsely and bluntly serrate, coriaceous, dark-green and glossy above, paler beneath, glabrous or silky-pubescent when young. Flowers small, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., polygamo-dioecious, in axillary racemes $\frac{1}{2}$ –1 in. long; pedicels silky, as is the perianth externally. Male perianth shallow, 5–6-partite almost to the base; stamens about 12. Female (or hermaphrodite) perianth with a swollen tube contracted above; segments of the limb short, spreading. Stamens either all reduced to erect scales, or some or all of the outer row perfect.

Carpels numerous; styles long, silky. Fruiting-perianth much enlarged and elongated, often quite 1 in. long, narrow-urceolate, splitting irregularly into 3-5 valves. Achenes 6-12, narrowed into long plumose styles.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 218; *Kirk, Forest Fl.* t. 71. *Atherosperma novæ-zealandiæ*, *Hook. f. Handb. N.Z. Fl.* 240.

NORTH ISLAND: Abundant in swampy forests. SOUTH ISLAND: Various localities in Marlborough, Nelson, and Westland, rare and local. Sea-level to 2000 ft. *Pukatea*. October-November.

The wood is pale-brown, often prettily clouded with darker brown. It is strong and tough, and does not readily split, so that it is occasionally used for boat-building, and more rarely for cabinetwork. The leaves and young branches are aromatic when bruised.

ORDER LXIX. LAURINEÆ.

Trees or shrubs, often aromatic. (*Cassytha* is a leafless parasitic climber.) Leaves alternate, rarely opposite, usually simple and entire, often gland-dotted; stipules wanting. Flowers regular, hermaphrodite or unisexual, generally small, usually in axillary cymes or panicles or clusters. Perianth inferior, herbaceous or coloured, deeply cut into 4-8 (usually 6) imbricate segments. Stamens usually twice the number of the perianth-segments, inserted in 2-3 series on the perianth-tube, all fertile or some reduced to staminodia; filaments flattened, naked or provided with 2 glands at the base; anther-cells 2-4, opening by upturned valves. Ovary free, 1-celled; style simple, terminal; stigma capitate, entire or lobed; ovule solitary, pendulous, anatropous. Fruit a drupe or berry, rarely dry, free or enclosed in the perianth. Seed solitary, pendulous; albumen wanting; embryo with large plano-convex cotyledons, radicle minute, superior.

An important order, having its headquarters in tropical America and Asia, less common in tropical Africa or in Australia and the Pacific islands, while few species penetrate into either the north or south temperate zones. Genera 35; species approaching 900. The order includes many useful plants, the chief of which are the camphor laurel, cinnamon, alligator pear, sassafras, &c. The timber of not a few species is highly valued on account of its toughness and fine and solid grain. The three New Zealand genera are all widely diffused in tropical regions.

Trees. Flowers hermaphrodite, panicled. Three inner anthers extrorse	1. BEILSCHMIEDIA.
Trees. Flowers diceious, umbellate; umbels involucrate. Anthers all introrse	2. LITSÆA.
Leafless parasitic twining herbs	3. CASSYTHA.

1. BEILSCHMIEDIA, Nees.

Trees or shrubs. Leaves alternate or opposite, penninerved. Flowers small, hermaphrodite, panicled or fascicled. Perianth-tube short; limb with 6 subequal segments. Perfect stamens 9 in 3

series; the 2 outer series with introrse anthers and eglandular filaments; the third series with extrorse anthers and filaments 2-glandular at the base; an inner fourth series of 3 staminodia present. Ovary not immersed in the perianth-tube, the perianth ultimately wholly deciduous. Fruit an oblong or ovoid or globose berry.

A small genus, comprising about 20 species, scattered through tropical Asia and Africa, Australia, New Zealand, and tropical America. The two species found in New Zealand are endemic. Hooker's genus *Nesodaphne*, which was formed for their reception, is now merged with *Beilschmiedia*.

Branches stout, clothed with red-brown tomentum. Leaves

obovate	..	..	..	..	..	1. <i>B. Tarairi</i> .
Branches slender, glabrous or nearly so.	Leaves lanceolate					2. <i>B. Tawa</i> .

1. **B. Tarairi**, *Benth. and Hook. f. ex T. Kirk Forest Fl.* t. 43.—A tall evergreen tree 50–70 ft. high, with a straight erect trunk $1\frac{1}{2}$ –3 ft. diam.; bark dark-brown, smooth and even; young branches, petioles, veins of the leaves beneath, upper surface of young leaves, and branches of the inflorescence densely clothed with red-brown velvety tomentum. Leaves alternate, petiolate, 3–6 in. long, obovate-oblong or broadly oblong, obtuse, quite entire, coriaceous, glabrous above when mature with impressed veins, glaucous and finely pubescent beneath with prominent veins; petioles about $\frac{1}{2}$ in. long. Panicles axillary, shorter than the leaves, $1\frac{1}{2}$ –2 $\frac{1}{2}$ in. long; branches spreading. Flowers small, $\frac{1}{8}$ in. diam.; pedicels short; bracts linear, obtuse, caducous. Berry 1–1 $\frac{1}{2}$ in. long, ovoid, dark-purple.—*Nesodaphne Tarairi*, *Hook. f. Fl. Nov. Zel.* i. 217; *Handb. N.Z. Fl.* 238. *Laurus Tarairi*, *A. Cunn. Precur.* n. 351; *Raoul, Choix*, 42.

NORTH ISLAND: In forests from the North Cape to the East Cape and Raglan, but local to the south of Auckland. Sea-level to 1200 ft. *Tarairi*. October–December.

One of the handsomest trees in the colony, and one of the most distinct in general appearance. The wood is light, close-grained, and easily worked, but is unfortunately wanting in strength and durability.

2. **B. Tawa**, *Hook. f. and Benth. ex T. Kirk Forest Fl.* t. 126.—A tall forest-tree 40–80 ft. high, with a trunk 1–4 ft. in diam.; bark thin, smooth, dark brownish-black; branches slender, silky when young. Leaves alternate, petiolate, 2–4 in. long, usually lanceolate, but often broader and oblong-lanceolate or elliptic-oblong, acute, quite entire, very finely reticulate on both surfaces, often glaucous beneath; petioles $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Panicles slender, glabrous, $1\frac{1}{2}$ –3 in. long; branches lax, elongate. Flowers minute, hardly $\frac{1}{8}$ in. diam. Berry rather smaller than in the preceding species, about 1 in. long, ovoid, dark-purple.—*Nesodaphne Tawa*, *Hook. f. Fl. Nov. Zel.* i. 217; *Handb. N.Z. Fl.* 239. *Laurus Tawa*, *A. Cunn. Precur.* n. 352; *Raoul, Choix*, 42. *L. Victoriana*, *Col. ex Hook. f. Handb. N.Z. Fl.* 239.

NORTH ISLAND: Abundant in forests throughout. SOUTH ISLAND: Nelson and Marlborough—In various localities on the shores of Cook Strait. Sea-level to 2500 ft. *Tawa*. November–December.

A well-known tree, in many portions of the North Island constituting the largest portion of the forest. The wood is white, straight in the grain, easily worked, and is largely used for buckets, tubs, casks, &c. The plum-like fruit was formerly collected by the Maoris for food, the pulpy portion being eaten in the raw state, and the kernel after prolonged steaming.

2. LITSÆA, Lam.

Trees or shrubs. Leaves alternate or rarely opposite, penninerved or triplinerved; leaf-buds naked or scaly. Flowers dioecious, in 4-6- or rarely many-flowered umbels; umbels axillary or fascicled or racemose, each one enclosed before the expansion of the flowers within a globose involucre; involucre scales 4-6, broad, concave. Perianth-tube ovoid or campanulate or scarcely conspicuous; limb with 4-6 segments, rarely more or fewer. Male flowers: Stamens usually 9-12; the filaments of the inner row or all glandular at the base; anthers all introrse, 4-celled. Ovary rudimentary. Female flowers: Staminodia present. Ovary oblong or ovoid, narrowed into the style; stigma usually dilated and irregularly lobed. Fruit a more or less succulent berry, seated on the usually enlarged perianth-tube.

Species about 150, most abundant in tropical and eastern Asia, the Malayan and Pacific islands, and Australia, rare in Africa and America. The single species found in New Zealand is endemic therein.

1. *L. calicaris*, Benth. and Hook. f. ex T. Kirk Forest Fl. t. 10.—A perfectly glabrous closely branched leafy tree 30-40 ft. high, with a trunk $1\frac{1}{2}$ - $2\frac{1}{2}$ ft. diam; bark dark greyish-brown. Leaves alternate, petiolate, 2-5 in. long, ovate or ovate-oblong, obtuse or narrowed into an obtuse point, quite entire, firm but hardly coriaceous, often glaucous beneath; petioles $\frac{1}{2}$ -1 in. long. Flowers often very abundantly produced, in 4-5-flowered involucre umbels arranged in short axillary racemes. Involucre leaves usually 4. Pedicels short, silky. Perianth-segments 5-8, oblong or ovate, obtuse. Stamens about 12; filaments slender, all with 2 stipitate glands near the base. Female flowers rather smaller and less numerous than the males. Staminodia flattened, each 2-glandular near the base. Ovary ovoid; stigma dilated, irregularly 3-lobed. Berry oblong-ovoid, $\frac{3}{4}$ in. long, reddish, seated in a flat cup-shaped disc composed of the enlarged perianth-tube.—*Tetranthera calicaris*, Hook. f. Fl. Nov. Zel. i. 216; *Handb. N.Z. Fl.* 238. T. Tangao, R. Cunn. ex A. Cunn. Precur. n. 353. *Laurus calicaris*, Sol. ex A. Cunn. Precur. n. 353; Raoul, Choix, 42.

NORTH ISLAND: Not uncommon in forests from the North Cape southwards to Rotorua and the East Cape. Sea-level to 2000 ft. *Mangeao*; *Tangeao*. September–October.

Wood strong, tough, and elastic, suitable for all classes of coopers' or wheelwrights' work, for ships' blocks, &c.

3. **CASSYTHA**, Linn.

Leafless twining parasites, attaching themselves to living shrubs or trees by means of small suckers; stems terete, wiry or filiform. Leaves replaced by minute scales. Flowers small, hermaphrodite, in spikes or heads or racemes, each flower 3-bracteolate. Perianth-tube turbinate or ovoid; segments of the limb 6, the 3 outer much smaller. Perfect stamens usually 9 in 3 series; the two outer series either all perfect or rarely the second series reduced to staminodia; anthers introrse; filaments eglandular; the third series all perfect with extrorse anthers, the filaments 2-glandular at the base; an inner fourth series of 3 staminodia present. Ovary almost free from the perianth at the time of flowering; stigma small. Fruit altogether enclosed in the enlarged and succulent perianth-tube, crowned by the persistent limb. Seed with a membranous testa. Embryo with thick fleshy cotyledons, which are distinct in the young state, but confluent when mature.

A very remarkable genus of parasitic plants with the habit of *Cuscuta*. Species about 15, 1 of which is very widely distributed, 1 or 2 are found in South Africa, and 1 in Borneo; the remainder are all Australian, 1 of them being the same as the New Zealand species.

1. **C. paniculata**, *R. Br. Prodr.* 404.—Stems pale yellow-green, much branched, several feet in length, covering small shrubs with dense interwoven masses; branches $\frac{1}{10}$ in. diam., glabrous or minutely silky at the very tips; scales minute, ovate or ovate-lanceolate, membranous. Spikes numerous, often branched, $\frac{1}{2}$ –2 in. long. Flowers minute, distant, sessile, about $\frac{1}{10}$ in. diam. Perianth glabrous; the 3 outer segments very small; the inner obtuse. Stamens 9, all perfect. Ovary glabrous. Fruit globose, about the size of a pea, enclosed in the enlarged and succulent perianth-tube, obscurely 6-ribbed or quite smooth.—*Hook. f. Fl. Nov. Zel.* i. 218; *Handb. N.Z. Fl.* 239; *Benth. Fl. Austral.* v. 311.

NORTH ISLAND: Extreme northern peninsula, from the North Cape to Ahipara and Mongonui, abundant. December–March.

ORDER LXX. **PROTEACEÆ.**

Shrubs or trees, rarely herbs. Leaves usually alternate, very rarely opposite or whorled, generally hard and coriaceous, entire or toothed or variously divided; stipules wanting. Flowers usually hermaphrodite, inflorescence various. Perianth inferior, regular or irregular; segments 4, valvate, at first cohering into a cylindric tube, at length separating and becoming revolute. Stamens 4, inserted on the perianth-segments and opposite to them; filaments short; anthers erect, adnate, 2-celled, introrse. Hypogynous glands 4, alternating with the stamens. Ovary superior, 1-celled, often oblique; style terminal, variously thickened and enlarged at

the top; stigma terminal or lateral; ovules solitary or geminate or many. Fruit either an indehiscent nut or drupe, or a dehiscent coriaceous or woody follicle, more rarely a 2-valved capsule. Seeds exalbuminous; embryo straight, with fleshy cotyledons, radicle inferior.

A large and well-marked order, chiefly found in Australia and South Africa, but extending to the Pacific islands and tropical Asia on the one side and South America on the other; absent in Europe, North Asia, and North America. Genera about 50; species estimated at 950. Several species are cultivated for ornamental purposes, but few possess any useful properties. Of the two indigenous genera, *Knightia* has 2 species in New Caledonia, while *Persoonia* is largely developed in Australia. The meagre representation of the order in New Zealand, compared with its abundance in Australia, is a very curious and almost inexplicable feature of the flora.

Small spreading tree. Leaves entire. Fruit fleshy	..	1. PERSOONIA.
Tall fastigate tree. Leaves serrate. Fruit a woody		
follicle	.. .. .	2. KNIGHTIA.

1. PERSOONIA, Smith.

Shrubs or small trees. Leaves entire, alternate or sometimes almost whorled. Flowers small, hermaphrodite, yellowish or white, solitary and axillary, or in axillary or terminal racemes. Perianth regular, constricted above the base or cylindrical; segments ultimately separating to the base or nearly so, upper portion revolute. Stamens affixed at or below the middle of the perianth-segments; filaments short; anthers usually all perfect, oblong or linear. Hypogynous scales 4, small. Ovary stipitate; style short and thick, or elongated and filiform; stigma terminal; ovules 2 or rarely 1, orthotropous, pendulous from the top of the cell. Fruit a drupe, either 1-celled and 1-seeded, or obliquely 2-celled and 2-seeded; exocarp more or less succulent; endocarp thick and hard.

Species about 60, all confined to Australia except the present one, which is endemic in the North Island of New Zealand.

1. **P. Toru**, *A. Cunn. in Bot. Mag.* sub t. 3513.—A handsome closely branched tree 15 to 30 or 40 ft. high; trunk 6–18 in. diam.; branchlets woody, terete, glabrous or the younger ones minutely puberulous. Leaves alternate, 4–8 in. long, narrow linear-lanceolate, acute or apiculate or rarely obtuse, gradually narrowed into a short petiole, quite entire, very thick and coriaceous, glabrous, smooth and polished on both surfaces, veins very obscure. Racemes axillary, strict, erect, 6–12-flowered, everywhere clothed with ferruginous pubescence. Perianth yellowish-brown, shortly pedicelled, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, pubescent externally. Ovary almost sessile, glabrous; style short, thick, not reaching the anthers; stigma oblique. Drupe oblong, reddish, $\frac{1}{2}$ – $\frac{2}{3}$ in. long, 1- or 2-celled, with a single seed in each cell.—**P. Tora**, *A. Cunn. Precur.* n. 349; **Raoul**, *Choix*, 42. **P. Toro**, *Hook. f. Fl. Nov. Zel.* i. 219; *Handb. N.Z. Fl.* 241; **Kirk**, *Forest Fl.* t. 74.

NORTH ISLAND: Not uncommon in woods from the North Cape to Rotorua and the East Cape. Sea-level to 2800 ft. *Toru*; *Toro*. October–November.

The specific name was given as “*Toru*” in Cunningham’s original description in the “*Botanical Magazine*,” and according to Mr. Colenso this is the proper spelling of the Maori name. It was, however, changed to “*Tora*” in Cunningham’s subsequently published “*Precursor*,” and was again altered to “*Toro*” by Sir J. D. Hooker. The wood is dark-red and prettily figured, and is occasionally used for inlaying and ornamental cabinetwork.

2. *KNIGHTIA*, R. Br.

Trees or shrubs. Leaves alternate, coriaceous, coarsely toothed or entire. Flowers hermaphrodite, regular, arranged in axillary or terminal dense-flowered racemes; pedicels in pairs. Perianth cylindrical; the segments at first cohering by their margins, but ultimately separating and revolute to the base. Stamens affixed above the middle of the segments; filaments very short; anthers long, linear, acute. Hypogynous glands 4, distinct. Ovary sessile, 1-celled; style long, straight, linear-clavate; ovules 4. Follicles coriaceous, 1-celled, 4-seeded. Seeds winged at the top.

A small genus of 3 species, the typical one confined to New Zealand. The remaining two are natives of New Caledonia, and form the subgenus *Eucarpha*, characterized by the large deciduous bracts.

1. *K. excelsa*, R. Br. in *Trans. Linn. Soc.* x. (1810) 194, t. 2.—A tall slender tapering tree 60–90 ft. high, with the narrow fastigiate mode of growth of a Lombardy poplar; trunk 2–4 ft. diam.; bark dark-brown or almost black; branches erect, the younger ones angled and clothed with rusty brown pubescence. Leaves of mature trees 4–6 in. long, linear-oblong or narrow obovate-oblong, obtuse, coarsely and bluntly toothed, very coriaceous, hard, rigid, almost woody, pubescent when young, quite glabrous when old; leaves of young trees not so coriaceous, longer and narrower, 4–10 in. long, linear or linear-lanceolate, often acute, more acutely serrate. Racemes lateral, sessile, 2–4 in. long; peduncles and perianth densely clothed with bright red-brown velvety tomentum. Flowers in pairs on short pedicels, densely crowded, 1–1½ in. long. Perianth cylindric, swollen above; segments separating to the base and coiling up into a twisted mass. Ovary tomentose; style 1–1¼ in. long, stout, erect, clavate above. Follicles 1½ in. long, pubescent, tapering into the persistent style, ultimately splitting into 2 boat-shaped valves.—*A. Cunn. Precur.* n. 350; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 219; *Handb. N.Z. Fl.* 241; *Kirk, Forest Fl.* t. 35.

NORTH ISLAND: Common in woods throughout. SOUTH ISLAND: Southern shores of Cook Strait, Croixelles Harbour, *Kirk*; Pelorus Sound, *Buchanan, J. Rutland*! Sea-level to 2800 ft. *Honeysuckle*; *Rewarewa*. November–December.

A tall handsome tree, easily distinguished by its fastigiate mode of growth. The wood is beautifully variegated, reddish on a light-brown ground, and is much used for inlaying and cabinetwork, ornamental turnery, &c. For an account of the fertilisation of the flowers, see a paper by myself in Vol. II. of the Journal of the Australasian Association.

ORDER LXXI. THYMELÆACEÆ.

Shrubs or trees, rarely herbs, inner bark tough and stringy. Leaves opposite or alternate, simple and entire; stipules wanting. Flowers regular, hermaphrodite or rarely unisexual, in axillary or terminal heads or clusters, racemes or spikes, rarely solitary. Perianth inferior, gamophyllous, tubular or campanulate, often swollen at the base; throat usually furnished with scales or glands; limb with 4-5 imbricate lobes. Stamens as many or twice as many as the corolla-lobes (in *Pimelea* 2 only) inserted on the perianth-tube; anthers 2-celled. Ovary superior, 1-celled or rarely 2-celled; style short or long, terminal or lateral; stigma capitate; ovules solitary or 1 in each cell, pendulous, anatropous. Fruit indehiscent, a drupe or nut or berry. Seed pendulous, testa thin or crustaceous; albumen fleshy or wanting; embryo straight, cotyledons fleshy, radicle superior.

An order of moderate size, scattered over most parts of the world. Genera nearly 40, species estimated at 360. Many of the species are more or less acrid and caustic, as the spurge-laurel and mezereum, both of which are used in medicine. The roots of several furnish a yellow dye, and the tough inner bark of others is employed for cordage. *Lagetta lintearia* yields the well-known lace-bark. Several species of *Daphne* and *Pimelea* are well-known garden-plants. Of the 2 New Zealand genera, *Pimelea* is found elsewhere only in Australia, where it is largely developed; *Drapetes* has a wider range, extending to Australia and Borneo on one side and South America on the other.

No scales within the perianth.	Stamens 2	..	..	1. PIMELEA.
Scales of the perianth 4 or 8.	Stamens 4	..	..	2. DRAPETES.

1. PIMELEA, Banks and Solander.

Shrubs or undershrubs, rarely herbs. Leaves opposite or alternate, usually small. Flowers hermaphrodite or polygamo-dioecious, usually terminal and capitate. Perianth-tube cylindrical; limb spreading, rarely erect, 4-lobed; throat without scales but sometimes thickened or folded. Stamens 2, inserted on the throat of the perianth opposite the 2 outer lobes; filaments slender; anthers introrse. Hypogynous disc wanting. Ovary 1-celled; style elongated; stigma capitate; ovule solitary, pendulous. Fruit small, drupaceous, included in the base of the perianth; epicarp dry or fleshy; endocarp crustaceous. Seed pendulous, with a membranous testa; albumen scanty or copious.

A very natural and distinct genus of over 80 species, confined to Australia and New Zealand. The 12 species found in New Zealand are all endemic, with the exception of *P. longifolia*, which is said to occur in Lord Howe Island. Several of them are exceedingly variable, and appear to be connected by intermediate forms, making their proper definition a matter of great difficulty. This

is specially the case with *P. virgata*, *P. lævigata*, *P. Urvilleana*, and *P. Lyallii*, the numerous forms of which require a careful study in the field before their proper position can be determined.

The flowers of *Pimelea* are usually described as hermaphrodite. But all the New Zealand species are functionally dicæious, or occasionally polygamodicæious. The male flowers are the most numerous and the most conspicuous. The stamens have long slender filaments, so that the anthers either reach the top of the perianth-lobes or are slightly exserted; and the style with its comparatively small stigma is always included within the perianth. I have never seen fruit in this form, and believe that the pistil is quite functionless. The female flowers are smaller, often swollen at the base, although narrower above. The anthers are small, almost sessile, and are usually devoid of pollen. The ovary is large, with a short style and large capitate stigma, which is conspicuously exserted when the flower is mature. Pollen is sometimes present in this form, but in the majority of cases the flowers are strictly female.

A. Erect shrubs. Branches and leaves usually glabrous.

- | | |
|---|---------------------------|
| Leaves 1-3 in., broad or narrow lanceolate, flat. Flowers | |
| $\frac{1}{2}$ in. long | 1. <i>P. longifolia</i> . |
| Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong or linear-oblong, often keeled. | |
| Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. | 2. <i>P. Gnidia</i> . |
| Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., oblong or obovate-oblong, obtuse. Flowers | |
| $\frac{1}{2}$ - $\frac{1}{2}$ in. | 3. <i>P. Traversii</i> . |

B. Erect or rarely procumbent shrubs. Branches pubescent or villous with silky hairs.

- | | |
|--|--------------------------|
| Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., quadrifariouly imbricate, oblong or elliptic, keeled, glabrous; floral often larger | 4. <i>P. buxifolia</i> . |
| Leaves $\frac{1}{2}$ -1 in., not imbricate, linear-lanceolate, flat, silky beneath | 5. <i>P. virgata</i> . |
| Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., in distant pairs, broadly lanceolate, silky beneath | 6. <i>P. Haastii</i> . |
| Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., opposite and decussate, oblong or elliptic, under-surface clothed with appressed white silky hairs | 7. <i>P. arenaria</i> . |

C. Prostrate or procumbent or rarely erect shrubs. Branches pubescent or villous with silky hairs.

- | | |
|---|---------------------------------|
| Branches grey, pubescent or villous or glabrate. Leaves $\frac{1}{10}$ - $\frac{1}{2}$ in., linear-oblong to obovate-oblong, usually glabrous | 8. <i>P. lævigata</i> . |
| Branches with soft villous hairs. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., oblong, obtuse, glabrous | 9. <i>P. Urvilleana</i> . |
| Branches tortuous, sparingly silky. Leaves $\frac{1}{2}$ in., narrow linear-lanceolate, surfaces glabrous, margins and apices ciliate | 10. <i>P. Suteri</i> . |
| Branches silky. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., linear-oblong to elliptic-oblong, silky | 11. <i>P. Lyallii</i> . |
| Branches densely silky-villous. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in., linear-oblong to elliptic-oblong, very densely silky-villous on both surfaces | 12. <i>P. sericeo-villosa</i> . |

P. polycephala, Col. in Trans. N.Z. Inst. xxii. (1890) 487, a small densely branched species with something of the appearance of a dwarf specimen of *P. Traversii*, differs from all the known New Zealand species in the coloured and membranous floral leaves. But the type specimen in Mr. Colenso's herbarium is a mere fragment in very bad condition, and until better specimens are obtained it is quite impossible to be sure of the relationships of the plant.

1. **P. longifolia**, *Banks and Sol. ex Wikstr. in Vet. Akad. Handl. Stockh.* (1818) 280.—A small erect much-branched shrub 2–5 ft. high, perfectly glabrous except the inflorescence and sometimes a minute tuft of hairs at the tips of the young leaves; bark dark reddish-brown. Leaves crowded, opposite, spreading or sub-erect, 1–3 in. long, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad, oblong- or elliptic-lanceolate to lanceolate, acute or acuminate, narrowed into a very short petiole, coriaceous, flat, smooth, midrib and lateral veins distinct beneath; floral leaves similar or slightly broader. Flowers in compact many-flowered heads terminating the branches, sessile, sweet-scented, white or white tinged with rose, polygamo-dicæcious. Receptacle villous. Perianth densely silky-villous; males the largest, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, with exserted anthers on slender filaments and a rather short style with small capitate stigma. Females smaller and narrower; anthers smaller, on short filaments, usually without pollen; style longer, with a larger capitate and papillose stigma. Fruit dry with a membranous epicarp, included in the swollen base of the perianth.—*Hook. f. Fl. Nov. Zel.* i. 220; *Handb. N.Z. Fl.* 242; *Benth. Fl. Austral.* vi. 7. *Passerina longifolia*, *Thunb. Mus. Nat. Acad. Upsal.* xiii. 106.

Var. **lanceolata**.—Leaves narrower, 1–2 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, linear-lanceolate. Flowers smaller.—*P. lanceolata*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 483 (male). *P. similis*, *Col. l.c.* (female). *P. angulata*, *Col. l.c.* xviii. (1886) 265 (*a form with occasionally 3 or 4 stamens*).

NORTH ISLAND: Not uncommon throughout. SOUTH ISLAND: Nelson—From Collingwood southwards to Westport. Sea-level to 3000 ft. *Taranga*. October–December.

2. **P. Gnidia**, *Willd. Sp. Plant.* i. 50.—A stout erect much-branched shrub 1–5 ft. high, glabrous except the inflorescence and sometimes a tuft of silky hairs in the axils of the leaves; bark dark reddish-brown. Leaves close-set, opposite, shortly petioled, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, oblong or oblong-lanceolate or linear-oblong, usually acute at both ends, rigid and coriaceous, often slightly keeled by the prominent midrib, veinless, margins usually slightly thickened; floral similar or rather broader. Flowers in compact many-flowered heads terminating the branches, sessile, white or pale-rose, polygamo-dicæcious. Perianth densely silky-villous, $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Anthers exserted. Style slender; stigma capitate, exserted. Fruit dry.—*A. Rich. Fl. Nouv. Zel.* 171; *A. Cunn. Precur.* n. 343; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 221; *Handb. N.Z. Fl.* 243. *Banksia Gnidia*, *Forst. Char. Gen.* 8, t. 4. *Passerina Gnidia*, *Forst. Prodr.* n. 170. *Cookia Gnidia*, *Gmel. Syst.* i. 24.

Var. **pulchella**.—Robust. Leaves larger, $\frac{1}{2}$ –1 in. long, elliptic-lanceolate or linear-obovate, acute or obtuse, not keeled, lateral veins often evident. Heads larger with more numerous flowers. Flowers almost as large as those of *P. longifolia*. Intermediate between *P. Gnidia* and *P. longifolia*, and with equal claims to be referred to either species.

NORTH ISLAND: Ruahine Range, *Colenso* (Handbook). SOUTH ISLAND: Marlborough and Nelson—Mount Stokes, *J. H. Macmahon*! Torrent Bay, Sandy Bay, *Kingsley*! Maitai Valley, Mount Owen, Wangapeka, *T. F. C.*; Mount Rochfort, *W. Townson*! Otago—Dusky Bay, *Forster*, *Menzies*, *Enys*! Sea-level to 4000 ft. December–January.

Very close to *P. buxifolia*, but always to be distinguished by the glabrous branches.

3. *P. Traversii*, *Hook. f. Handb. N.Z. Fl.* 243. — A small very stout usually erect densely branched shrub 6–24 in. high; branches stout, often tortuous, prominently tubercled at the insertion of the fallen leaves, glabrous or slightly pubescent, usually with a tuft of silky hairs in the axils of the leaves; bark blackish-brown. Leaves closely quadrifariously imbricated, sessile, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, oblong or obovate-oblong to suborbicular, obtuse, thick and coriaceous, quite glabrous, midrib evident or obscure, veinless, margins often edged with red; floral leaves larger and broader, often twice or thrice as large, sometimes drying a peculiar verdigris-green. Flowers numerous, densely capitate, white or pinkish-white, polygamo-dicæcious. Perianth densely silky-villous, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, the females shorter and broader than the males. Anthers in the male flowers almost reaching the top of the lobes, in the female flowers small and empty and on very short filaments. Ripe fruit not seen.

SOUTH ISLAND: Marlborough—Kaikoura Mountains, *Monro*, *Buchanan*! Nelson—Mount Percival and Clarence Valley, *T. F. C.* Canterbury—Hurunui Mountains, *Travers*; Upper Waimakariri, *Kirk*! Ashburton Mountains, *Potts*! Rangitata Valley, *Armstrong*! Mount Dobson, *T. F. C.* Otago—Mount St. Bathans, Mount Ida, *Petrie*! 2000–4500 ft. December–February.

In its ordinary state a distinct little species, easily recognised by the very robust habit, stout scarred and usually glabrous branches, small broad leaves, and numerous rather large flowers. Diffuse or almost prostrate forms, with slightly pubescent branches, show an approach to *P. lævigata*.

4. *P. buxifolia*, *Hook. f. Handb. N.Z. Fl.* 243. — A small stout erect compactly branched shrub 1–5 ft. high; branches stout, densely clothed with coarse short greyish hairs; bark brownish-black, muricated. Leaves quadrifariously imbricated, shortly petioled, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, oblong-ovate or elliptic-oblong, acute or obtuse, coriaceous, glabrous, keeled, much wrinkled beneath, lateral veins conspicuous or obsolete, often verdigris-green when dry; floral leaves usually larger and broader. Flowers numerous, densely capitate, white or pink, polygamo-dicæcious. Perianth silky-villous, $\frac{1}{4}$ – $\frac{1}{2}$ in. long; females shorter and broader. Anthers in the male flowers on long filaments, almost reaching the top of the perianth-lobes; in the females minute, empty. Ripe fruit not seen.—*P. stylosa*, *Col. in Trans. N.Z. Inst.* xx. (1888) 205. *P. subsimilis*, *Col. l.c.* xxviii. (1896) 609. *P. montana*, *Col. l.c.* xxxi. (1899) 279.

NORTH ISLAND: Mountains near the head of the Tairua River, *J. Adams*! Mount Hikurangi, *S. Dodgshun*, *Adams* and *Petrie*! Tongariro and Ruapehu, *Colenso*, *Captain G. Mair*! *H. Hill*! *Rev. F. H. Spencer*! Ruahine Mountains, *Colenso*, *Petrie*! *A. Hamilton*! *H. Hill*! Kaweka Mountain, *Colenso*! 1500–4500 ft. December–March.

Very close to *P. Gnidia*, but easily distinguished by the branches being hirsute with coarse hairs. Hooker mentions the “evident lateral nerves” of the leaves as a good character, but I find that the leaves frequently have the veins very obscure.

5. *P. virgata*, *Vahl. Enum. i. 306.*—A slender erect much-branched shrub 1–4 ft. high; branches long, slender, virgate, slightly ringed with the scars of the fallen leaves, younger ones more or less clothed with appressed silky hairs. Leaves spreading, close together or remote, not imbricate, almost sessile, $\frac{1}{2}$ –1 in. long, linear-lanceolate, acute or acuminate, not coriaceous, flat, nerveless, usually glabrous above, pilose with appressed silky hairs beneath; floral leaves similar or occasionally larger and ovate-lanceolate. Flowers in compact 6–12-flowered heads at the tips of the branches, sometimes becoming axillary by the rapid growth of leafy shoots springing from beneath the heads. Perianth $\frac{1}{4}$ – $\frac{1}{3}$ in. long, densely silky-villous; tube swollen at the base; lobes ovate, obtuse. Fruit usually baccate, white, ovoid-oblong, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, often hairy at the tip.—*A. Rich. Fl. Nouv. Zel. 173*; *A. Cunn. Precur. n. 345*; *Raoul, Choix, 42*; *Hook. f. Fl. Nov. Zel. i. 220*; *Handb. N.Z. Fl. 243*. *P. pilosa*, *Willd. Sp. Plant. i. 50*. *P. dichotoma*, *Col. in Trans. N.Z. Inst. xxii. (1890) 485*. *Passerina pilosa*, *Linn. f. Suppl. 226*; *Forst. Prodr. n. 171*.

NORTH AND SOUTH ISLANDS: From the Three Kings Islands and the North Cape to Nelson and Marlborough. Sea-level to 2000 ft. September–December.

A common plant in the northern portion of the colony, well marked by the slender habit and rather lax lanceolate spreading leaves.

6. *P. Haastii*, *T. Kirk in Trans. N.Z. Inst. xii. (1880) 396.*—“A strict low-growing shrub 6–10 in. high; branches few (?), very slender, white with silky hairs. Leaves in distant pairs, petioled, ascending, narrow-lanceolate, $\frac{3}{4}$ – $1\frac{1}{4}$ in. long, acute, hairy below or nearly glabrous, margins recurved; floral leaves similar. Flowers 5–8 in a head, very small; perianth swollen below, silky; lobes narrow, spreading. Filaments short. Style equalling the perianth-tube. Fruit not seen.”

SOUTH ISLAND: Alps of Canterbury, *Haast*, *Armstrong*!

Of this species I have only seen a single very fragmentary specimen in Mr. Kirk’s herbarium, and have consequently quoted the original description. It appears to differ little from *P. virgata*, except in the more slender habit and distant rather longer and broader leaves.

7. *P. arenaria*, *A. Cunn. in Bot. Mag.* t. 3270.—An erect or spreading rarely procumbent shrub 9–30 in. high; branches stout, strict, erect or ascending, simple or dichotomously or corymbosely branched above, densely clothed with long silvery white appressed silky hairs. Leaves opposite and decussate, close-set or remote, not usually imbricating, spreading or deflexed, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, elliptic-oblong to broadly oblong-ovate or almost orbicular, obtuse or subacute, flat, coriaceous, veinless, glabrous or sparsely pilose above, densely clothed with shining silky appressed hairs beneath; floral leaves rather larger and broader. Flowers in compact 5–15-flowered heads at the tips of the branches, white, polygamodiceous. Perianth shaggy with white silky hairs, $\frac{1}{5}$ – $\frac{1}{4}$ in. long; tube short; lobes oblong, obtuse; females smaller, with a broader base. Anthers oblong. Fruit baccate, rather large.—*Precur.* n. 347; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 221; *Handb. N.Z. Fl.* 244. *Passerina villosa*, *Thunb. in Mus. Acad. Upsal.* xiii. 106. *Gymnococca arenaria*, *Fisch. and Mey. Ind. Sem. Hort. Petrop.* x. (1845) 47.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant on sand-dunes on all the coasts. *Aute-taranga*; *Toroheke*. November–March.

A most beautiful plant, at once recognised by the copious white silky hairs on the branches and under-surface of the leaves. According to Mr. Colenso, the berries were formerly eaten by the Natives, who also used the inner bark of the branches for preparing cloth-like strips for fastening up their hair.

8. *P. lævigata*, *Gaertn. Fruct.* i. 186, t. 39, f. 1.—A small prostrate or suberect much-branched shrub; branches scarred, stout or slender, long or short, from 4 or 6 in. to 2 ft. long; the younger ones usually more or less pubescent or sometimes glabrate, seldom white with villous hairs as in *P. Urvilleana*; bark dark-brown or reddish-brown. Leaves sometimes crowded and quadrifariouly imbricate, at other times laxly placed, erect or spreading or deflexed, $\frac{1}{10}$ – $\frac{1}{3}$ in. long, lanceolate or linear-oblong to elliptic-oblong or obovate-oblong, obtuse or acute, flat or concave, nerveless or the midrib prominent beneath, usually glabrous on both surfaces; floral leaves rather larger and broader. Flowers in few- or many-flowered heads at the tips of the branches, small, white, polygamodiceous. Perianth $\frac{1}{8}$ – $\frac{1}{4}$ in. long, more or less silky-villous or pilose, the females smaller and narrower than the males. Fruit usually baccate, white, ovoid, acute.—*P. prostrata*, *Willd. Sp. Plant.* i. 51; *A. Rich. Fl. Nouv. Zel.* 174; *A. Cunn. Precur.* n. 346; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 220; *Handb. N.Z. Fl.* 244. *P. rugulosa*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 102. *P. microphylla*, *P. bicolor*, and *P. heterophylla*, *Col. l.c.* xxii. (1890) 484–486. *Passerina prostrata*, *Forst. Prodr.* n. 172. *Cookia prostrata*, *Gmel. Syst.* 24.

Var. **erecta**.—Stems stout, erect or suberect. Heads usually many-flowered.

Var. **repens**.—Stems more slender, procumbent or prostrate, often very diffusely branched. Flowers fewer and smaller.

Var. **alpina**.—Stems stout, suberect or spreading, branches tortuous, scarred, often nearly glabrous.

NORTH AND SOUTH ISLANDS: From the Three Kings Islands and the North Cape southwards to the Bluff, abundant. Sea-level to 4500 ft. October–March.

An almost polymorphous plant, the various forms of which are much in need of careful study and comparison.

9. **P. Urvilleana**, *A. Rich. Fl. Nouv. Zel.* 175.—A small widely spreading rather laxly branched procumbent shrub; branches 4–18 in. long, scarred, the younger ones white with copious short appressed silky hairs. Leaves close-set, usually quadrifariouly imbricating, spreading or deflexed, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, linear-oblong to oblong or oblong-ovate, obtuse or subacute, thick and coriaceous, concave, nerveless, usually glabrous on both surfaces; floral leaves usually larger and broader. Flowers in 4–8-flowered heads at the tips of the branches, small, white. Perianth $\frac{1}{8}$ – $\frac{1}{5}$ in. long, villous with long white hairs; lobes equalling the tube, broadly oblong, obtuse. Fruit baccate, white.—*A. Cunn. Precur.* n. 348; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 221; *Handb. N.Z. Fl.* 244. *P. prostrata* var. *Urvilleana*, *Meisn. in D.C. Prodr.* xiv. 517. *Gymnococca microcarpa*, *Fisch. and Mey. Ind. Sem. Hort. Petrop.* x. (1845) 47.

NORTH ISLAND: Usually near the sea. Bay of Islands, *Cunningham*; Whangarei Heads, Great Barrier Island, *Kirk*! Little Barrier Island, *T. F. C.*; vicinity of Auckland, *Colonel Haultain*! Taranaki, *Dieffenbach*. SOUTH ISLAND: Nelson—Tasman Bay, *D'Urville*. October–March.

A very imperfectly understood species, apparently only differing from states of *P. laevigata* in the copious snow-white hairs on the young branches.

10. **P. Suteri**, *T. Kirk in Trans. N.Z. Inst.* xxvi. (1894) 259.—A small much-branched shrub 4–12 in. high; branches spreading or suberect, often tortuous; the younger ones sparingly pilose with rather long straight silky hairs; bark dark red-brown or black. Leaves crowded, shortly petiolate or nearly sessile, erecto-patent, about $\frac{1}{3}$ in. long, narrow linear-lanceolate, subacute, coriaceous, concave above, both surfaces glabrous or rarely with a few lax hairs, margins and apices ciliated with long straight hairs. Flowers in 4–8-flowered heads at the tips of the branches, white, polygamodiceous. Perianth $\frac{1}{4}$ – $\frac{1}{3}$ in. long, villous with white hairs. Fruit baccate, red, ovoid, acute, hairy at the tip.

SOUTH ISLAND: Nelson—Dun Mountain Range. *W. T. L. Travers*! *P. Lawson*! *R. J. Kingsley*! 2000–3500 ft.

A peculiar little plant, closely related to *P. Lyallii* and *P. laevigata*, but differing from both in the narrower leaves, with ciliate margins and apices.

11. *P. Lyallii*, *Hook. f. Fl. Nov. Zel.* i. 222.—A small stout prostrate or suberect much-branched shrub 6–18 in. high; branches sometimes long, spreading or trailing, at other times shorter, ascending or erect; the younger ones more or less silky-pilose with appressed hairs, rarely almost glabrous; bark dark red-brown. Leaves usually close-set, erect or patent, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, linear-oblong or elliptic-oblong or lanceolate, acute or acuminate, concave, nerveless, glabrous above or nearly so, silky with long hairs beneath or almost glabrate; floral leaves similar to the others. Flowers in 4–12-flowered heads at the tips of the branches, white. Perianth about $\frac{1}{4}$ in. long, densely silky-villous; lobes ovate-oblong, obtuse. Anthers short, oblong.—*Handb. N.Z. Fl.* 245.

Var. *sericea*.—Usually erect. Branchlets and leaves on both surfaces densely clothed with long silky appressed hairs, the leaves usually larger and broader.

NORTH ISLAND: Ruahine Range, *Colenso*! *Tryon*! *A. Hamilton*! Var. *sericea*: Ruahine Range, *Colenso*! Hawke's Bay, *A. Hamilton*! SOUTH ISLAND, STEWART ISLAND: The typical form abundant in mountain districts throughout. Var. *sericea*: Kurow and other places in the Waitaki Valley, *Buchanan*! *Petrie*! Clutha Valley, *Petrie*! Crown Range, Cardrona, *Kirk*! Usually from 2000 to 4500 ft., but descends to sea-level in the south of Otago and on Stewart Island. December–March.

An exceedingly variable plant. Slender erect forms approach *P. virgata*, others with smaller almost glabrous leaves seem to pass into *P. levigata*, while the extreme state of var. *sericea* has much of the appearance of *P. arenaria*. Var. *sericea* is referred to *P. virgata* in *Kirk's* herbarium, but I think it is better placed under *P. Lyallii*.

12. *P. sericeo-villosa*, *Hook. f. Handb. N.Z. Fl.* 245.—A much-branched prostrate shrub, forming compact depressed patches 3–18 in. across, everywhere densely villous with long pale silky hairs; branchlets short, stout, densely leafy. Leaves crowded, closely imbricating, erect, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear-oblong or elliptic-oblong, obtuse or acute, concave, both surfaces villous with long straight hairs, which usually completely conceal the leaf. Flowers in 2–6-flowered heads at the tips of the branches, white. Perianth $\frac{1}{6}$ – $\frac{1}{5}$ in. long, densely silky-villous; lobes ovate-oblong, obtuse.

SOUTH ISLAND: Marlborough—*Monro*; Mount Duppa, *Macmahon*! Nelson—Wairau Mountains, *Travers*; Jollie's Pass, *Haast*! *T. F. C.*; Upper Clarence Valley, *T. F. C.* Canterbury—Lake Tekapo and Mackenzie Plains, *T. F. C.* Otago—Waitaki Valley, *Hector* and *Buchanan*! Clutha Valley, from Cromwell to Lake Wanaka and Lake Hawea, *Petrie*! 500–3500 ft. December–March.

Differs from *P. Lyallii* in its more completely prostrate and often densely compacted habit, and in the far more copious covering of long straight silky hairs.

2. DRAPETES, Banks.

Small prostrate spreading or densely tufted shrubby plants. Leaves small, alternate, imbricate, concave. Flowers hermaphrodite or polygamo-dicæious, sessile in small terminal heads. Perianth tubular or funnel-shaped; lobes 4, spreading; throat usually furnished with 1 or 2 scales opposite each lobe, rarely naked. Stamens 4, inserted on the throat of the perianth and alternate with its lobes; filaments short, filiform; anthers oblong. Hypogynous scales wanting. Ovary sessile, 1-celled; style long; stigma capitate; ovule solitary, pendulous. Fruit a small drupe; epicarp thin, fleshy; endocarp crustaceous. Seed pendulous, cotyledons broad, thick.

A small genus of 5 species, found in Fuegia, New Zealand, Australia, New Guinea, and Borneo. The New Zealand species are endemic.

Branches glabrous or slightly villous. Leaves $\frac{1}{10}$ – $\frac{1}{6}$ in., linear or linear-ligulate. Male perianth funnel-shaped.

Scales 4, entire or 2-lobed, or 8 in very closely approximate pairs

1. *D. Dieffenbachii*.

Branches densely villous. Leaves $\frac{1}{8}$ – $\frac{1}{4}$ in., linear-subulate, broadest at the base. Male perianth funnel-shaped.

Scales 8, in distinct pairs

2. *D. villosa*.

Branches closely compacted. Leaves $\frac{1}{12}$ – $\frac{1}{10}$ in., ovate-oblong, subacute. Male perianth almost campanulate.

Scales 8, in distinct pairs

3. *D. Lyallii*.

Fruiting specimens of a *Drapetes* found on Mount Sinclair, Banks Peninsula, have been identified by Dr. Berggren with the Australian and Tasmanian *D. tasmanica*, Hook. f., but I have seen no specimens. According to Bentham, it is very close to *D. Dieffenbachii*, principally differing in the smaller and more hairy perianth, the lobes of which are as long as the tube.

1. *D. Dieffenbachii*, Hook. in Lond. Journ. Bot. ii. (1843) 497, t. 17.—A small creeping and rooting much-branched plant; stems woody at the base, 3–12 in. long; branches stout or slender, scarred, ascending at the tips, glabrous or slightly villous with short white hairs. Leaves usually close-set and imbricating, but sometimes distant on barren shoots, suberect, often incurved at the tips, $\frac{1}{10}$ – $\frac{1}{6}$ in. long, linear or linear-ligulate, obtuse, concave in front, convex on the back, grooved or striate or almost smooth, glabrous or nearly so when old, but the upper half of the margins and the apex ciliate when young. Flowers small, polygamodiceous, in 3–8-flowered heads at the tips of the branches, sunk amongst the uppermost leaves. Male perianth about $\frac{1}{6}$ in. long, funnel-shaped, the lobes about $\frac{1}{3}$ the length of the tube. Scales very variable, sometimes a single entire one at the base of each lobe, but more often the scale is 2-lobed or divided to the base into 2 distinct but closely approximate scales. Stamens with long slender filaments, the anthers almost reaching the top of the lobes. Ovary and style very small, abortive. Female (or hermaphrodite) perianth smaller and broader. Anthers much smaller, usually

empty, on shorter filaments. Ovary large, densely villous at the tip; style long; stigma capitate, exserted. Fruit small, ovoid.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 222; *Handb. N.Z. Fl.* 245. *D. macrantha*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 487. *Kelleria Dieffenbachii*, *Endl. Gen. Suppl.* iv. 61; *Meisn. in D.C. Prodr.* xiv. 566.

Var. *laxa*.—Pale-green, more laxly branched. Leaves larger, spreading or ascending, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear-oblong, obtuse, rather thin, almost flat, conspicuously nerved, ciliate on the margins and back. Heads 3–8-flowered. Perianth-lobes almost equalling the tube; scales 8, small. Perhaps a distinct species.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common in mountain districts from Moehau (Cape Colville) and Hikurangi southwards. Var. *laxa*: Ruahine Mountains, *H. Tryon*! Nelson—Mountains flanking the Wairau Valley, *T. F. C.*; Mount Murchison, *Townson*! 2000–4500 ft. December–March.

A very variable plant, which does not seem to be separated by any definite characters from the following species. The var. *laxa* may prove distinct, but it requires further study with a larger suite of specimens than has yet been obtained.

2. *D. villosa*, *Cheesem*.—Very similar in most of its characters to *D. Dieffenbachii*, but usually a more robust plant, with the branchlets more or less villous with greyish hairs, and with slightly larger leaves that are somewhat broader at the base, and have the margins and frequently the back ciliate to the base. Flowers in 3–4-flowered heads at the tips of the branches, similar to those of *D. Dieffenbachii*, but the glands always 8.—*Kelleria villosa*, *Berggren in Minnesk. Fisiog. Sallsk. Lund.* (1877) 18, t. 5, f. 1–15.

Var. *multiflora*.—Leaves longer, strict, ascending, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, narrow linear-lanceolate, tapering from the base to an obtuse tip, slightly convex on the back, conspicuously 5-nerved; margins ciliate with long straight hairs and with a pencil of hairs at the apex. Flowers in 5–12-flowered heads at the tips of the branches. Glands 8, very small.

SOUTH ISLAND: Mountain districts in Nelson, Canterbury, and Otago, apparently not uncommon. Var. *multiflora*: Nelson—Mount Arthur Plateau, *T. F. C.*; Mount Faraday, *Townson*! Canterbury—Candlestick Mountains, *Cockayne*! Mount Torlesse, *T. F. C.* Westland—Kelly's Hill, *Petrie*! 2500–4500 ft. December–March.

Not at all a satisfactory species. The var. *multiflora* agrees in the villous branches, but differs in a marked degree in the longer, strict, strongly nerved leaves, and more numerous flowers. All the forms of *villosa* and *Dieffenbachii* are much in need of a careful revision.

3. *D. Lyallii*, *Hook. f. Fl. Nov. Zel.* ii. 336.—A compactly branched moss-like plant, usually forming dense patches 1–4 in. diam.; branches short, erect or ascending. Leaves very densely imbricate, usually erect, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, narrow-ovate or ovate-oblong or ovate-subulate, broadest at the base and then tapering gradually to an acute or subacute tip, convex and smooth on the

back, not prominently nerved, apex and margins ciliate. Flowers small, polygamo-dicecious, solitary or 2-3 together at the tips of the branches. Male perianth $\frac{1}{10}$ – $\frac{1}{8}$ in. long, broadly funnel-shaped or almost campanulate; lobes about as long as the tube, oblong-ovate, each with 2 glands at the base. Stamens with slender filaments; anthers almost reaching the top of the lobes. Ovary small, with a very short style. Female perianth (or hermaphrodite) smaller and rather broader, $\frac{1}{12}$ – $\frac{1}{10}$ in. long. Anthers very small, usually empty, on very short filaments. Ovary ciliate at the top; style long, stout; stigma capitate, exserted. — *Handb. N.Z. Fl.* 246. *D. muscosa*, *Hook. f. Fl. Nov. Zel.* i. 223 (not *Lam.*). *Kelleria Dieffenbachii* var. *Lyallii*, *Meisn. in D.C. Prodr.* xiv. 566.

SOUTH ISLAND: Nelson—Wairau Gorge, *T. F. C.*; Mount Owen, *T. F. C.*; Waiau Valley, *Travers.* Canterbury—Southern Alps, *Sinclair* and *Haast, Armstrong.* Otago—Lake district, *Hector* and *Buchanan!* Dunstan Mountains, *Hector* Mountains, Mount Pisa, Mount Cardrona, &c., *Petrie!* STEWART ISLAND: *Lyall, Kirk!* 4000–6500 ft. December–March.

A well-marked species, at once recognised by the compact habit, small ovate-oblong or ovate-lanceolate leaves, and broad almost campanulate perianth.

ORDER LXXII. LORANTHACEÆ.

Parasitic shrubs. Leaves opposite or alternate, simple and entire, coriaceous, sometimes reduced to scales or wanting; stipules absent. Flowers regular, hermaphrodite or unisexual, axillary or terminal, solitary or in racemes or spikes or fascicles, usually with a bract on each pedicel and 2 bracteoles below each flower. Perianth double, outer adnate to the ovary, limb short or barely evident, truncate or 4-6-toothed; inner 3-6-lobed, lobes free or united into a tube, valvate. Stamens as many as the divisions of the perianth, usually inserted on them; filaments short or long; anthers introrse, 2-celled. Ovary inferior, 1-celled; style short or long; stigma simple; ovule solitary, erect, adnate to the walls of the ovary. Fruit a 1-seeded berry or drupe, pericarp usually viscid. Seed generally albuminous; embryo straight, axile, radicle superior.

An order comprising 13 genera and about 500 species, chiefly found in the tropical or warm regions of both hemispheres, with comparatively few species in the temperate zones. The order has no important properties or economic value, and the common mistletoe is the only species of any repute. Of the 3 New Zealand genera, *Tupeia* is endemic; the remaining two are widely distributed in both temperate and tropical climates.

- | | |
|---|---------------|
| Leafy. Flowers hermaphrodite. Perianth double. Anthers opening lengthwise | 1. LORANTHUS. |
| Leafy. Flowers dicecious. Perianth single. Anthers on slender filaments, opening lengthwise | 2. TUPEIA. |
| The New Zealand species leafless. Flowers dicecious. Perianth single. Anthers sessile, opening by several pores | 3. VISCUM. |

1. **LORANTHUS**, Linn.

Parasitic shrubs. Leaves opposite or rarely alternate, entire, coriaceous. Flowers hermaphrodite, often highly coloured, yellow or orange or red, rarely white or greenish, in axillary racemes or cymes, rarely solitary. Perianth double; outer (calyx) adnate to the ovary; limb short, truncate or 4-6-toothed; inner (corolla) tubular, of 4-6 free or more or less connate petals, their tips ultimately spreading or reflexed. Stamens as many as the petals and inserted on them; filaments distinct; anthers adnate or versatile. Ovary inferior; style filiform; stigma terminal. Fruit a berry.

A large genus of about 350 species, abundant in the tropics, but rare in temperate regions. The New Zealand species are all endemic.

A. Anthers continuous with the filament, not versatile.

* Petals free to the base.

Flowers small, greenish, $\frac{1}{2}$ in. long, in small trichotomous panicles

Flowers 1 in. long, axillary, solitary or 2-4 together 1. *L. micranthus*.

Flowers $1\frac{1}{2}$ -2 in. long, in 3-9-flowered racemes 2. *L. tetrapetalus*.

.. .. 3. *L. Colensoi*.
** Petals united to the middle or nearly so (sometimes dorsally split to the base in *L. Adamsii*).

Flowers $1\frac{1}{2}$ -2 in. long, 2 to 4 at the top of a short axillary

peduncle 4. *L. Adamsii*.

Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. long, in 10-15-flowered racemes 5. *L. flavidus*.

B. Anthers not continuous with the filament, versatile.

Flowers 1 in. long, in axillary trichotomous panicles 6. *L. tenuiflorus*.

1. ***L. micranthus***, Hook. f. *Fl. Nov. Zel.* i. 100.—A perfectly glabrous bushy shrub 2-5 ft. high; branches terete, the younger ones flattened and 2-edged. Leaves opposite, $1\frac{1}{2}$ -3 in. long, oblong or elliptic-oblong or oblong-obovate, rounded at the tip, narrowed into a stout petiole about $\frac{1}{3}$ in. long, thick and coriaceous, veins very obscure. Panicles small, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, axillary, trichotomously branched, many-flowered; branches slender, divaricating. Flowers minute, greenish, $\frac{1}{8}$ in. long. Calyx-tube cylindrical; limb very minute, truncate. Corolla of 4 linear-oblong spreading petals, free to the base. Anthers small, oblong, basifixed. Style stout, short, suddenly twisted up and down at the middle; stigma lateral, capitate. Berry bright-yellow, oblong, viscid, $\frac{1}{8}$ in. long.—*Handb. N.Z. Fl.* 107. *Viscum antarcticum*, A. Cunn. *Precur.* n. 483 (not of Forst.).

NORTH AND SOUTH ISLANDS: Abundant in lowland districts throughout. Sea-level to 2000 ft. October-November.

Easily distinguished by its small green flowers. Parasitic on *Coprosma*, *Melicope*, *Leptospermum*, &c.

2. **L. tetrapetalus**, *Forst. Prodr.* n. 156.—A bushy shrub 3–6 ft. high; stems usually numerous from the base, often adhering to the host for a considerable distance; branches spreading, terete, greyish; branchlets compressed, glabrous or minutely pubescent. Leaves opposite and decussate, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, elliptic-oblong or ovate-oblong, rounded at the tip, narrowed into a short petiole at the base, very thick and coriaceous, pale yellowish-green when fresh, reddish when dry, midrib and veins obscure. Flowers bright-red, either solitary or 2–4 together in the axils of the leaves, erect; peduncles short, stout. Calyx-limb cupular, obscurely 4-toothed. Corolla about 1 in. long, swollen and 4-angled at the base, terete above, ultimately splitting to the base into 4 linear petals, which are erect below, but reflexed at the tip. Anthers narrow-linear, basifixed. Style equalling the corolla; stigma capitate.—*A. Rich. Fl. Nouv. Zel.* 268; *A. Cunn. Precur.* n. 486; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 99; *Handb. N.Z. Fl.* 107. *L. decussatus*, *T. Kirk in Trans. N.Z. Inst.* iii. (1871) 162. *L. punctatus*, *Col. in Trans. N.Z. Inst.* xv. (1883) 323.

NORTH AND SOUTH ISLANDS: Not uncommon from the Little Barrier Island and Cape Colville to the south-west of Otago. 500–4000 ft. November–January.

In the southern portion of the colony this is usually parasitic on *Fagus*, in the north on *Quintinia*. Through a curious misconception, Mr. Kirk applied the name of *tetrapetalus* to the plant now known as *L. Adamsii*, and described the true *tetrapetalus* as a distinct species under the name of *L. decussatus*.

3. **L. Colensoi**, *Hook. f. in Hook. Ic. Plant.* t. 633.—A large much-branched perfectly glabrous bush; branchlets terete. Leaves opposite, $1\frac{1}{2}$ –3 in. long, broadly oblong or obovate or almost orbicular, obtuse, narrowed into a stout petiole $\frac{1}{3}$ – $\frac{3}{4}$ in. long, very thick and coriaceous, veinless or the veins very obscure. Peduncles stout, axillary, $\frac{1}{2}$ –1 in. long, 3–9-flowered. Flowers sessile, opposite, large, scarlet, $1\frac{1}{2}$ –2 in. long; a small deciduous leaf-like bract at the base of each flower; bracteoles wanting. Calyx-limb prominent, cupular, truncate or obscurely sinuate. Corolla terete or nearly so in bud, swollen at the base and towards the tip, splitting into 4 linear petals free to the base. Anthers very narrow-linear, basifixed. Style straight, equalling the corolla.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 99; *Handb. N.Z. Fl.* 107.

NORTH ISLAND: Lake Waikaremoana, parasitic on *Metrosideros tomentosa*, *Colenso*! Mount Hikurangi and other places in the East Cape district, *Adams* and *Petrie*, *Bishop Williams*! various localities in Wellington Province, *Buchanan*! SOUTH ISLAND: Not uncommon in wooded districts throughout. Sea-level to 2000 ft. December–January.

A very handsome species. It is usually parasitic on *Fagus*, but has also been noticed on *Pittosporum* and *Metrosideros*.

4. **L. Adamsii**, *Cheesem. in Trans. N.Z. Inst.* xiii. (1881) 296.—A perfectly glabrous bush 2–4 ft. high; branchlets terete. Leaves opposite, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long, broadly oblong or oblong-obovate, obtuse, narrowed into a short stout petiole or almost sessile, very thick and coriaceous, veins hardly visible, margins slightly recurved. Peduncles very short, axillary, each bearing 2–4 sessile flowers; a small concave bract and 2 bracteoles at the base of each flower. Flowers rather large, $1\frac{1}{2}$ –2 in. long, reddish, more or less tinged with yellowish-green. Calyx-limb short, with 4 minute triangular teeth. Corolla narrow at the base, swollen in the middle, and then contracted just below the limb; lobes 4, separating about $\frac{1}{4}$ -way down, reflexed, but the corolla often splits dorsally to the base, the lobes then all turning one way. Anthers narrow-linear, basifixed, tips acute. Style equalling the corolla; stigma capitate.

NORTH ISLAND: Auckland—Thames goldfields, *Adams!* *T. F. C.*; Hunua, *Kirk!* September–October.

The foliage of this almost precisely matches that of *L. Colensoi*, but the flowers are very different. Parasitic on *Coprosma*, *Myrsine*, and *Melicope*.

5. **L. flavidus**, *Hook. f. Fl. Nov. Zel.* i. 100, t. 27.—A sparingly branched glabrous shrub 1–3 ft. high; branches spreading. Leaves opposite, 1– $2\frac{1}{2}$ in. long, linear-oblong, usually rounded at the tip, rarely apiculate, narrowed at the base into a short petiole, flat, very coriaceous, veins inconspicuous, or 3–5 diverging from the base; margins thickened and very minutely crenulate when dry, often red when fresh. Racemes axillary, 10–16-flowered, spreading or drooping, $\frac{3}{4}$ –2 in. long; peduncle slender, tetragonous; pedicels opposite and decussate, about $\frac{1}{8}$ in. long; bracts obsolete. Flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. long, orange-yellow. Calyx-limb minute, cupular, truncate. Corolla slender, swollen above the base; petals united almost to the middle, upper part sharply reflexed, linear-spathulate. Anthers small, linear-oblong. Style rather longer than the corolla; stigma large, capitate.—*Handb. N.Z. Fl.* 107. *L. polychroa*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 241.

NORTH AND SOUTH ISLANDS: Not uncommon in *Fagus* forests from the Ruahine Mountains and Mount Egmont southwards. Sea-level to 2500 ft. December–February.

Usually parasitic on the various species of *Fagus*.

6. **L. tenuiflorus**, *Hook. f. Fl. Nov. Zel.* i. 100.—A small glabrous shrub; branches slender, terete. Leaves opposite, 1– $1\frac{1}{2}$ in. long, obovate or obovate-oblong, obtuse, narrowed into short slender petioles, veins few, slender. Flowers about 1 in. long, in axillary trichotomous puberulous panicles; peduncles and pedicels slender, divaricating, about $\frac{1}{4}$ in. long. Corolla slender, terete, curved; petals very narrow, united $\frac{2}{3}$ -way up, but perhaps ultimately separating. Anthers oblong, versatile. Style slender; stigma simple.—*Handb. N.Z. Fl.* 107.

NORTH ISLAND: Locality unknown.

Founded upon a single specimen in the Kew Herbarium, the exact locality of which is not known. It is evidently a most distinct species, differing from all others found in New Zealand in the many-flowered trichotomous panicles. The anthers are not fully described by Hooker, but in the "Genera Plantarum" the species is referred to the subgenus *Phrygilanthus* (now often kept as a distinct genus), in which they are versatile.

2. TUPEIA, Cham. et. Schl.

A parasitic shrub; branches terete, jointed. Leaves opposite or alternate, flat, broad or narrow. Flowers diœcious, in small axillary and terminal panicles. Perianth-tube of the male flowers very small, of the female flowers adnate to the ovary; limb 4-partite, rarely 5-partite. Stamens in the male flowers affixed to the base of the segments; filaments long, filiform; anthers ovate-oblong. Ovary in the female flowers inferior, ovoid; style short and thick; stigma obtuse. Fruit a subglobose 1-seeded berry; mesocarp succulent and viscid. Seed globose; albumen copious, fleshy; embryo almost terete.

The genus is limited to a single species, endemic in New Zealand.

1. *T. antarctica*, Cham. and Schl. in *Linnæa*, iii. (1828) 203.—A small branching shrub 2–3 ft. high; bark pale; branchlets finely pubescent. Leaves very variable in size and shape, $\frac{1}{2}$ –2½ in. long, from broad ovate-rhomboid to elliptic- or oblong-lanceolate, acute or obtuse, narrowed into short petioles, pale-green, rather thin; veins faint but evident, anastomosing. Panicles shorter than the leaves, 6–12-flowered; peduncles and pedicels slender, pubescent. Flowers small, $\frac{1}{8}$ in. diam., greenish-yellow, often very abundantly produced. Segments of the male perianth linear-oblong or oblong-spathulate, of the female narrower and more acute. Stigma large, globular, obscurely lobed. Berry about $\frac{1}{4}$ in. diam., white or pink spotted with darker pink, pulp extremely viscid.—Hook. f. *Fl. Nov. Zel.* i. 101, t. 26; *Handb. N.Z. Fl.* 108. *T. Cunninghamii*, Mig. in *Linnæa*, xviii. (1844) 85. *T. pubigera*, Mig. l.c. 86. *T. undulata*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 329. *Viscum antarcticum*, Forst. *Prodr.* n. 370; *A. Rich. Fl. Nouv. Zel.* 269; *Raoul, Choix*, 42. *V. pubigerum*, *A. Cunn. Precur.* n. 484.

NORTH AND SOUTH ISLANDS: Not uncommon in wooded districts throughout. Sea-level to 3000 ft. *Pirita.* October–December.

A most variable plant. Parasitic on *Panax*, *Pittosporum*, *Carpodetus*, *Melicope*, *Myrsine*, &c., and occasionally on *Loranthus tetrapetalus* and *L. micranthus*.

3. VISCUM, Linn.

Parasitic shrubs; branches opposite, often dichotomous. Leaves opposite or none. Flowers diœcious or monœcious, very small,

solitary or fascicled in the axils of the leaves or at the nodes of the branches, rarely terminal. Perianth-tube of the male flowers very short and solid, of the females adnate to the ovary; limb 3-4-partite. Anthers as many as the perianth-segments and sessile on them, broadly ovate or oblong, opening by pores on the inner side. Ovary inferior; stigma large, pulvinate, sessile or nearly so. Fruit a 1-seeded berry, usually crowned by the remains of the perianth-segments; mesocarp succulent and viscid. Albumen copious, fleshy; embryos 1 or 2 in each seed.

About 30 species are known, widely spread through the tropical and temperate regions of the Old World.

Joints flat, broadly obovate, $\frac{1}{5}$ - $\frac{1}{2}$ in. long, $\frac{1}{8}$ - $\frac{1}{3}$ in. broad.

Flowers spicate, the spikes in lateral pairs and 1-3 terminal

1. *V. Lindsayi*.

Joints flat, linear-spathulate, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, $\frac{1}{10}$ - $\frac{1}{8}$ in. broad.

Flowers spicate, the spikes always solitary

2. *V. clavatum*.

Joints terete, $\frac{1}{10}$ - $\frac{1}{3}$ in. long, $\frac{1}{25}$ in. broad. Flowers sessile,

in whorls between the joints

3. *V. salicornioides*.

1. ***V. Lindsayi***, *Oliver ex Hook. f. Handb. N.Z. Fl.* 108.—A small succulent perfectly glabrous sparingly branched leafless little plant 2-6 in. high; branches opposite, divaricate, jointed; joints much flattened, $\frac{1}{5}$ - $\frac{1}{2}$ in. long, $\frac{1}{8}$ - $\frac{1}{3}$ in. broad, broadly obovate to obovate-spathulate, coriaceous, dark-green, often punctate. Spikes usually 2 (rarely 4) to each node and 1 to 3 at the top of the terminal joint, about $\frac{1}{4}$ in. long, jointed, the tip of each successive joint expanded and enclosing a whorl of 6-10 closely packed flowers. Flowers very minute, diœcious; the males pyriform, of 3 fleshy perianth-segments, each bearing a sessile anther on its inner face; the females of an ovoid ovary crowned by 3-4 perianth-lobes. Fruit obovoid, $\frac{1}{15}$ in. long, tipped by the persistent perianth-lobes.—*Lindsay, Contr. N.Z. Bot.* 52, t. 2.

NORTH ISLAND: Hawke's Bay—Norsewood, *Colenso*! Patangata, *Tryon*! SOUTH ISLAND: Marlborough—Pelorus Sound, *Macmahon*! Canterbury—Near Christchurch, *Armstrong*. Otago—Vicinity of Dunedin, *Lindsay, Buchanan*! *Petrie*! Winton, *Kirk*! October–February.

Parasitic on *Sophora*, *Melicope*, *Myrtus*, *Metrosideros*, *Coprosma*, *Myrsine*, &c.

2. ***V. clavatum***, *T. Kirk in Trans. N.Z. Inst.* xxiv. (1892) 429, t. 37.—Very closely allied to *V. Lindsayi*, and perhaps only a variety, but a smaller plant, seldom more than 2 in. high, with the joints of the stem much narrower, linear-spathulate, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, $\frac{1}{10}$ - $\frac{1}{8}$ in. broad. Spikes apparently always solitary, either terminal or from the nodes. Male flowers not seen, but female flowers and fruit quite like those of *V. Lindsayi*.

SOUTH ISLAND: Canterbury—Castle Hill Basin, 2000-3000 ft., *Enys*! *Kirk*! *T. F. C.*

Parasitic on *Aristotelia fruticosa*, *Discaria*, and *Coprosma*.

3. **V. salicornioides**, *A. Cunn. Precur.* n. 485.—A small tufted perfectly glabrous much-branched leafless species 2–4 in. high; branches opposite, rather succulent, terete, jointed; joints $\frac{1}{10}$ – $\frac{1}{3}$ in. long, $\frac{1}{25}$ in. broad, terete or obscurely flattened, expanded at the tip. Flowers very minute, diœcious, 4–8 together at the nodes, forming a ring round the branch, partly concealed by the expanded tip of the joints. Male flowers much the smallest; perianth-segments 3, triangular, each bearing a sessile anther on its inner face. Female flowers more numerous; ovary ovoid, crowned by 3 very minute perianth-lobes. Fruit $\frac{1}{20}$ in. long, ellipsoid, tipped by the persistent perianth-segments.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 101; *Handb. N.Z. Fl.* 108.

NORTH AND SOUTH ISLANDS: From Mongonui and Kaitaia southwards to Dunedin, but often local. Sea-level to 1500 ft.

Usually parasitic on *Leptospermum*, but also seen on *Gaultheria* and *Dracophyllum*.

ORDER LXXIII. SANTALACEÆ.

Trees or shrubs or herbs, often parasitic on the roots of other plants. Leaves alternate or opposite, simple and entire, sometimes reduced to minute scales or altogether wanting; stipules absent. Flowers regular, hermaphrodite or unisexual, usually small and greenish, solitary or in axillary or terminal cymes or spikes. Perianth superior or inferior, 3–6-lobed or -partite; lobes valvate, often hairy behind the anthers. Stamens 3–6, inserted on the perianth-lobes and opposite to them; anthers 2-celled. Ovary inferior, rarely superior, 1-celled; style short; stigma capitate or 3–4-lobed; ovules 2–3, pendulous from a central column. Fruit an indehiscent nut or drupe. Seed solitary, globose or ovoid; albumen copious, fleshy; embryo usually small, terete, radicle superior.

An order of moderate size, widely dispersed in both temperate and tropical regions. Genera 28; species not much exceeding 200. The only species of much economic value is *Santalum album*, which yields the well-known sandalwood. Both the New Zealand genera are found in Australia, and *Exocarpus* extends also to the Pacific islands, Malay Archipelago, and Madagascar.

Leafy. Perianth superior. Flowers in axillary cymes .. 1. FUSANUS.

Leafless. Perianth inferior. Flowers in axillary spikes .. 2. EXOCARPUS.

1. FUSANUS, R. Br.

Glabrous trees or shrubs. Leaves opposite or alternate. Flowers hermaphrodite or unisexual by abortion, in axillary or terminal racemes or fascicles. Perianth-tube turbinate, adnate to the ovary and produced above it into a projecting rim; segments 4–6, each furnished with a tuft of hairs at the base. Stamens 4–6, affixed to the base of the perianth-segments and shorter than them; anthers ovate, dehiscing longitudinally. Disc lining the projecting

part of the perianth-tube. Ovary inferior; style short, conic; stigma small, 2-4-lobed; ovules 2-4. Fruit a globose or turbinate drupe crowned at the summit by the annular scar of the perianth-segments; exocarp more or less fleshy; endocarp hard, often rugose. Embryo linear, in the centre of the albumen.

A small genus of 5 species, all Australian except the one found in New Zealand.

1. **F. Cunninghamii**, *Benth. and Hook. f. ex T. Kirk, Forest Fl.* t. 75, 76.—A small slender tree 10-25 ft. high; trunk seldom more than 9 in. diam.; bark grey. Leaves alternate or more rarely opposite, extremely variable in shape, 2-5 in. long, $\frac{1}{8}$ -1 in. broad, linear-lanceolate or lanceolate to ovate-lanceolate or elliptic-oblong or obovate, acute or acuminate, narrowed into short petioles, quite entire, dark-green and glossy, veined, minutely punctate. Inflorescence axillary, of few- or many-flowered racemes or cymes, rarely reduced to few-flowered fascicles. Flowers small, $\frac{1}{8}$ - $\frac{1}{4}$ in. diam., brownish-green, hermaphrodite or unisexual by abortion, the females the smallest. Perianth-tube hemispherical; segments 4-6, triangular, deciduous, each with a tuft of yellowish hairs at the base. Stamens the same number as the perianth-segments; filaments short, slender. Disc 4-6-lobed. Stigma 2-4-lobed. Drupe $\frac{1}{3}$ - $\frac{1}{2}$ in. long, narrow-turbinate, bright-red, crowned with the annular scar of the perianth-segments.—*Santalum Cunninghamii*, *Hook. f. Fl. Nov. Zel.* i. 223; *Handb. N.Z. Fl.* 247. *S. Mida*, *Hook. Ic. Plant.* t. 563, 575; *Raoul, Choix*, 42. *Mida salicifolia*, *M. eucalyptoides*, and *M. myrtifolia*, *A. Cunn. Precur.* n. 340, 341, 342.

NORTH ISLAND: Lowland forests from the North Cape to Cook Strait, but local to the south of Rotorua. Sea-level to 2000 ft. *Maire*; *New Zealand Sandal-wood*. September-October.

This differs from the Australian species of the genus in the alternate leaves, axillary inflorescence, and turbinate fruit. Cunningham constituted a separate genus for it under the name of *Mida*, and divided it into 3 species based upon the greater or lesser breadth of the leaves. But as leaves of all intermediate shapes can easily be found, and sometimes occur on the same branch, it is impossible to separate his species even as varieties. The wood is hard and dense, very strong and durable, and is occasionally used for ornamental turnery, inlaying, &c.

2. **EXOCARPUS**, Labill.

Shrubs or small trees. Leaves alternate or rarely opposite, often reduced to minute scales. Flowers minute, hermaphrodite or unisexual by abortion, in small axillary spikes or fascicles, each flower sessile or nearly so in a notch of the rhachis or axillary to a minute scale-like bract. Perianth inferior, divided to the base into 4-6 valvate segments. Stamens the same number as the perianth-segments and inserted near their base; filaments very short and broad;

anthers adnate, 2-celled, longitudinally dehiscent. Disc flat, thick, sinuately 4-6-lobed. Ovary superior, fleshy, conic; stigma small, sessile, entire or obscurely lobed. Fruit a nut or drupe seated on the enlarged and often succulent and coloured pedicel. Seed erect; testa thin; albumen copious; embryo minute, cylindric.

Species 16, 9 of which are found in Australia, one of them extending to the Malay Archipelago. The remaining 7 are found in Lord Howe Island, Norfolk Island, New Zealand, the Sandwich Islands, and Madagascar.

1. **E. Bidwillii**, *Hook. f. Fl. Nov. Zel.* i. 223, t. 52.—A small much-branched rigid procumbent shrub 6-24 in. high; branches ascending, short, stiff, terete, deeply furrowed. Leaves reduced to minute triangular scales, alternate, persistent. Flowers minute, arranged in short and stout 4-10-flowered spikes springing from the axils of the scale-like leaves; rhachis pubescent, excavated at the insertion of each flower; bract minute. Perianth-segments usually 5, but sometimes 4 or 6. Stamens the same number; filaments short. Nut oblong, black, about $\frac{1}{2}$ in. long, peduncle much enlarged and thickened, often red and succulent, the perianth-segments persistent under the fruit.—*Handb. N.Z. Fl.* 246.

SOUTH ISLAND: Not uncommon in the mountains of Nelson, Marlborough, Canterbury, and northern Otago. 1000-4000 ft. December-February.

ORDER LXXIV. BALANOPHOREÆ.

Low-growing fleshy leafless or scaly root-parasites. Stem reduced to a tuberous globular or misshapen often lobed rhizome. Peduncles short or long, thick, naked or clothed with scattered or imbricate scales. Flowers monœcious or diœcious, minute, crowded in spadix-like heads at the top of the peduncles. Male flowers: Perianth wanting or of 3-6 valvate lobes. Stamens 1-3, rarely more; filaments free or connate into a tube or column; anthers 2-many-celled. Female flowers: Perianth wanting or adnate to the ovary; limb absent or minutely toothed. Ovary ovoid or globose, 1-3-celled; styles 1-2, long or short or almost absent; stigmas simple or capitellate, sometimes sessile and discoid; ovules solitary in each cell, pendulous, anatropous. Fruit a minute crustaceous or coriaceous 1-seeded utricle or nut. Seed adherent to the pericarp, albuminous; embryo most minute.

A small but very remarkable order of fleshy root-parasites, chiefly tropical in its distribution, but nowhere plentiful. Genera, 14; species, 35.

1. DACTYLANTHUS, Hook. f.

A root-parasite. Rhizome usually subterranean, perennial, hard and woody, rounded or amorphous, often irregularly lobed, surface rough with small tubercles or warts. Flowering-stems or peduncles annual, numerous, crowded, clavate, clothed throughout with im-

bricate ovate or oblong brownish scales, the upper of which are larger and more closely placed, surrounding the spadices. Spadices numerous at the ends of the peduncles, slender, erect, cylindrical or slightly fusiform. Flowers very minute, densely packed, monœcious or dioecious. Male flowers: Perianth wanting or of 2 minute subulate processes. Stamens 1 or 2; filaments very short; anthers didymous, 2-celled. Female flowers: Perianth adnate to the ovary; limb of 2 or 3 erect subulate segments. Ovary stipitate, ovoid-oblong, 1-celled; style long, filiform; stigma terminal; ovule solitary, apparently pendulous. Fruit minute, crustaceous.

A very distinct monotypic genus, not closely allied to any other, confined to New Zealand.

1. **D. Taylora**, *Hook. f. in Trans. Linn. Soc.* xxii. (1859) 425, t. 75. —Rhizome stout, varying in size according to the age of the plant, 1-12 in. diam. or more. Flowering-stems 2-6 in. high, $\frac{1}{2}$ -1 in. diam., fleshy when young. Scales from $\frac{1}{4}$ to $\frac{1}{2}$ in. long at the base of the peduncle, larger above, frequently 1 in. Spadices almost concealed by the upper scales, 10-30 together or more, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. long. Flowers rather loosely placed towards the base of the spadix, very densely packed elsewhere.—*Handb. N.Z. Fl.* 255; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 493.

NORTH ISLAND: Auckland—Plateau between Hokianga and the Northern Wairoa, *P. Beddington*! from Port Charles to Cape Colville, *H. Nairn*! Thames goldfields, *Kirk*; East Cape district, *H. Hill*! Opepe (near Lake Taupo), *H. Hill*! *T. F. C.* Hawke's Bay—Tarawera and Nuhaka, *A. Hamilton*; Hawkston, *F. Hutchinson*! Taranaki—*W. H. Skinner*. Wellington—Waitotara, *J. R. Annabell*! Upper Rangitikei, *J. P. Marshall*; Upper Wanganui, *Rev. R. Taylor*, *H. C. Field*. Sea-level to 3500 ft. *Pua-reinga*. February-March.

Although I have seen a large number of specimens of this singular plant, few of them are in a satisfactory state, and the structure of both flowers and fruit should be worked out anew from fresh examples. Hooker describes the flowers as dioecious, but Mr. Hill assures me that both male and female peduncles frequently arise from the same rhizome. On the other hand, Mr. F. Hutchinson writes that the seeming mixture of sexes is due to the almost complete fusion of separate rhizomes growing close together. I possess a peduncle in which the lower flowers of all the spadices are female, and the upper ones male; but this is probably an uncommon variation. Some observers have doubted the invariable parasitism of the plant, but all the rhizomes I have seen are organically connected with the root on which they were growing, although the point of attachment is sometimes small, the rhizome wrapping over and enclosing the root, but remaining free from it for a considerable distance. The host is usually *Schefflera digitata*; but *Panax arboreum*, *Myrsine Urvillei*, *Pittosporum*, and *Fagus* are all frequently attacked.

ORDER LXXV. EUPHORBIACEÆ.

Herbs or shrubs or trees of exceedingly various habit; juice milky, acrid. Leaves alternate, rarely opposite, often stipulate. Flowers usually small, unisexual (in *Euphorbia* reduced to single naked stamens surrounding a solitary pistil and enclosed within a calyx-

like involucre). Perianth generally simple and calycine, but often wanting, rarely double, the inner of 4-5 minute petals. Stamens 1 to many; anthers 2-celled. Ovary superior, of 3 (rarely 2 or more than 3) united carpels; styles as many as the carpels, free or united, entire or divided; ovules 1 or 2 to each carpel, pendulous from the inner angle of the cell. Fruit either a capsule of 2-valved 1-2-seeded cocci separating from a persistent axis, or a 1-3-celled drupe, or of 1 or more combined nuts. Seed laterally attached at or above the middle of the cell; embryo straight, in the axis of fleshy albumen, cotyledons flat, radicle superior.

A large order, of about 200 genera and 3000 species, most abundant in the tropics, rare in very cold climates. Many species are poisonous, and a considerable number yield medicinal products, as castor-oil, croton-oil, gum euphorbium, &c. Others afford a wholesome food, as the manioc and tapioca. Of the 4 genera found in New Zealand, one (*Euphorbia*) has a worldwide distribution; another (*Poranthera*) is found elsewhere only in Australia. The two remaining (*Aleurites* and *Homalanthus*) have their headquarters in the Pacific islands, but extend northwards to China and the Malay Archipelago.

* Flowers without a perianth, several males and one female in a cup-shaped calyx-like involucre 1. EUPHORBIA.

** Flowers provided with a perianth.

Low-growing herbs. Flowers in terminal racemes or heads. Anthers opening by pores 2. PORANTHERA.
Trees with digitately lobed or veined leaves. Flowers in terminal cymes. Fruit large, somewhat fleshy, with 1-3 large oily seeds 3. ALEURITES.
Trees. Flowers in slender racemes; males numerous, females few at the base of the raceme. Fruit capsular 4. HOMALANTHUS.

1. EUPHORBIA, Linn.

Herbs or shrubs abounding in milky juice. Inflorescence of numerous males and a single female flower crowded in a small cup-shaped 4-5-lobed calyx-like involucre, the lobes usually alternating with as many fleshy glands, which often possess a white or coloured spreading limb. Male flowers consisting of a pedicelled stamen without floral envelopes of any kind; anther-cells globose. Female flower central in the involucre, of a long-pedicelled 3-celled ovary, also without floral envelopes; styles 3; ovules solitary in each cell. Capsule 3-lobed, splitting into 3 2-valved cocci, which fall away from a persistent axis.

A vast genus of worldwide distribution, very feebly represented in New Zealand. There are probably more than 600 species, of very diversified habit and characters. Several species from the Northern Hemisphere are naturalised in New Zealand, the most common being the milkweed, *E. Peplus*, a small glabrous annual branched from the base, with thin obovate entire leaves, an umbel of 2-3 repeatedly divided rays, smooth capsules, and pitted seeds.

1. ***E. glauca***, *Forst. Prodr.* n. 208.—A tall stout perfectly glabrous smooth and glaucous herb 1–3 ft. high. Stems from a creeping rhizome, erect, terete, lower portion marked with the scars of the fallen leaves, leafy above, umbellately branched at the top. Leaves crowded, 1–4 in. long, linear- or lanceolate-obovate to oblong-obovate, obtuse or mucronate, sessile, quite entire. Umbels broad; rays 5–6, each once or twice forked; floral leaves much broader than the cauline, broadly oblong. Involucres almost concealed by the floral leaves, shortly pedicelled, campanulate, $\frac{1}{4}$ in. diam.; glands 4–5, dark-purple, crescent-shaped. Capsule nearly as large as a pea, pendulous, globose, quite smooth and glabrous. Seeds smooth, greyish.—*A. Rich. Fl. Nouv. Zel.* 352; *A. Cunn. Precur.* n. 339; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 227; *Handb. N.Z. Fl.* 248.

NORTH AND SOUTH ISLANDS: Common along the shores from the North Cape to the south of Otago. *Waiuatua.* October–February. Also found in Norfolk Island.

2. **PORANTHERA**, Rudge.

Annual or perennial herbs, sometimes woody at the base. Leaves narrow, alternate, stipulate. Flowers racemose or subumbellate at the tips of the branches, or solitary in the axils of the upper leaves, monœcious or diœcious. Male flowers: Calyx deeply divided into 5 segments imbricate in the bud. Petals 5, small, sometimes wanting; anthers 4-celled, cells free, opening by terminal pores. Rudimentary ovary of 3 clavate bodies. Female flowers: Calyx and petals of the males. Stamens wanting. Ovary broad, 3-celled; styles 3, each divided into 2 linear branches; ovules 2 in each cell. Capsule depressed, globose, splitting into 3 2-valved cocci. Seeds reticulate; embryo terete, curved, cotyledons not broader than the radicle.

A small genus of 6 species, 5 of which are Australian, 1 of them extending to New Zealand. The remaining species is endemic in New Zealand.

Slender, diffusely branched. Leaves flat or nearly so.

Flowers in terminal racemes 1. *P. microphylla*.

Compactly branched. Leaves with the margins revolute

to the middle. Flowers solitary in the upper axils .. 2. *P. alpina*.

1. ***P. microphylla***, *Brong. in Dup. Voy. Coq. Bot.* 218, t. 50B.—A slender perfectly glabrous herb; branches diffuse, 6–9 in. long, prostrate at the base, ascending at the tips. Leaves opposite or alternate, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-obovate or spatulate, obtuse, gradually narrowed into a rather long petiole; margins flat or very slightly recurved. Flowers minute, greenish-white, in terminal bracteate racemes; bracts linear-subulate, lower ones exceeding the flowers. Petals linear, usually present in both sexes. Capsule membranous, depressed. Seeds small, brown, granulate.—*Benth. Fl. Austral.* vi. 56; *Cheesem. in Trans. N.Z. Inst.* xi. (1879) 432.

SOUTH ISLAND: Nelson—*Fagus* forest in the Maitai Valley, *T. F. C.*, *Kingsley*! Marlborough—Pelorus and Tinline Valleys, abundant, *Macmahon*! December–February.

Widely distributed in Australia and Tasmania.

2. **P. alpina**, *Cheesem. in Trans. N.Z. Inst.* xiv. (1882) 300.—Perfectly glabrous, 2–5 in. high; branches numerous, decumbent or suberect, usually densely compacted and interlaced, rarely open, scarred, often somewhat woody at the base. Leaves all uniform, opposite, crowded, sessile or very shortly petiolate, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, linear-oblong, obtuse, quite entire, smooth and veinless above; margins revolute, concealing the whole of the under-surface except the very thick and prominent midrib; stipules rather large, triangular. Flowers solitary in the axils of the upper leaves, forming short leafy heads, minute, greenish-white, diœcious; peduncles shorter than the leaves. Petals wanting in both sexes. Sepals 5, obovate, obtuse. Stamens shorter than the sepals; filaments slender. Ovary subglobose, 6-lobed, 3-celled. Capsule globose-depressed.—*Hook. f. in Hook. Ic. Plant.* t. 1366B.

SOUTH ISLAND: Nelson—Mount Arthur, Mount Owen, *T. F. C.*; Mount Murchison, *Townson*! 3000–5000 ft. December–January.

3. **ALEURITES**, Forst.

Trees with stellate pubescence. Leaves alternate, petiolate, large, entire or 3–7-lobed. Flowers in terminal cymes, monœcious. Male flowers: Calyx splitting into 2–3 valvate segments. Petals 5, longer than the calyx. Stamens 8–20, on a central receptacle, 5 outer opposite the petals, alternating with 5 small glands; anthers adnate, cells parallel. Female flowers: Calyx and petals of the males. Ovary 2–5-celled; styles 2–5, bifid; ovules 1 in each cell. Fruit large, drupaceous; exocarp somewhat fleshy; endocarp 1–5-celled. Seeds large; testa thick, woody; cotyledons broad, flat.

A small genus of 3 species, natives of eastern Asia and the Pacific islands.

1. **A. moluccana**, *Willd. Sp. Plant.* iv. 590.—A handsome spreading tree 30–40 ft. high or more; young leaves and branches more or less clothed with pale or ferruginous stellate pubescence, almost glabrous when old. Leaves crowded towards the ends of the branches, 4–9 in. long, very variable in shape, ovate-lanceolate to broadly rhomboid-ovate, obtuse or acute, entire or 3–5- or 7-lobed. Cymes broad, much branched, tomentose; pedicels short. Flowers numerous, white. Calyx very small, tomentose. Petals about $\frac{1}{4}$ in. long, obovate, bearded at the base. Stamens 15–20; filaments short, hairy. Female flowers fewer and smaller than the males. Fruit 2 in. diam., smooth, fleshy; seeds 1–2, rarely 3; testa rugose.—*Benth. Fl. Austral.* vi. 128; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 172. *A. triloba*, *Forst. Char. Gen.* 112, t. 56.

KERMADEC ISLANDS : Sunday Island, not uncommon on the northern and eastern sides of the island, *T. F. C.* *Candle-nut*.

Widely distributed in the Pacific islands and tropical Asia, also extensively planted and naturalised in hot countries. The seeds or "nuts" contain an excellent oil, so that in many parts of Polynesia they are strung on sticks and used as candles, whence the English name of "candle-nut."

4. **HOMALANTHUS**, A. Juss.

Glabrous shrubs or small trees. Leaves alternate, petiolate, broad, entire, often glaucous; stipules deciduous. Flowers in terminal racemes, small, apetalous, monœcious. Male flowers : Very numerous, occupying all the upper portion of the raceme. Calyx of 1 or 2 minute flat appressed sepals. Stamens 6–50; filaments very short; anther-cells distinct, divaricate, longitudinally 2-valved. Female flowers : Few or solitary at the base of the raceme. Calyx 2–3-partite. Ovary 2–3-celled; styles 2–3, linear, entire; ovules 1 in each cell. Capsule didymous or trigonous, fleshy, indehiscent or splitting into 2–3 2-valved cocci. Seeds with a fleshy aril.

Species 7–8, scattered through the Pacific islands, Australia, and the Malay Archipelago.

1. **H. polyandrus**, *Cheesem.* — A handsome slender tree 10–25 ft. high, everywhere perfectly glabrous; branches brittle, terete, marked with the prominent scars of the fallen leaves. Leaves in young plants 3–12 in. diam., in old much smaller, 2–4 in. long, broadly triangular-ovate or rhomboid-orbicular, acute, membranous, somewhat undulate, glaucous beneath; petiole as long or longer than the blade; stipules $\frac{3}{4}$ in. or more. Racemes slender, erect, 4–8 in. long. Male flowers : Very numerous, rather loosely placed, $\frac{1}{12}$ in. diam.; bracts minute, 1–2-glandular at the base. Stamens about 40, very short, closely packed in a globose head. Female flowers : 1 to 4 at the base of the raceme, on long slender pedicels, drooping. Capsule $\frac{1}{2}$ – $\frac{2}{3}$ in., trigonous, 3-celled, splitting into 3 cocci. Seed enveloped in a yellowish aril, frequently persistent on the axis of the fruit. — *H. nutans*, *Hook. f. in Journ. Linn. Soc. i. 127 (not of Guill.)*. *Carumbium polyandrum*, *Hook. f. Handb. N.Z. Fl. 248; Cheesem. in Trans. N.Z. Inst. xx. (1888) 172*.

KERMADEC ISLANDS : Sunday Island, plentiful; Macaulay Island, a few plants in the crater-basin, *T. F. C.* Flowers most of the year.

Endemic, but very closely allied to the Polynesian *H. pedicellatus*, Benth. (*Carumbium nutans*, Muell. Arg.), principally differing in the larger number of stamens.

ORDER LXXVI. **URTICACEÆ.**

Herbs or shrubs or trees, of very diversified habit and foliage. Leaves alternate or opposite, entire or toothed or more rarely divided; stipules present. Flowers unisexual, small and incon-

spicuous, cymose or fascicled or capitate, rarely solitary, sometimes crowded on a variously shaped receptacle with or without an involucre. Perianth simple, herbaceous, of 1-5 equal or unequal lobes or segments, imbricate or valvate in bud, in the female flowers often smaller and with fewer segments, rarely absent. Stamens generally the same number as the divisions of the perianth and opposite to them; filaments short and erect, or longer and then inflexed in bud, sometimes elastic; anthers 2-celled, dehiscing lengthwise. Ovary superior, or rarely more or less inferior, 1-celled; style terminal or lateral, simple or 2-partite with stigmatose branches, or reduced to a sessile fringed or plumose stigma; ovule solitary. Fruit simple, a small drupe or berry or achene, or (in genera not found in New Zealand) compound and composed of a confluent mass of the fruits and perianths of several or many flowers. Seed erect or pendulous; albumen present or more generally wanting; embryo straight or curved, radicle superior.

In the circumscription of this order I have followed the "Genera Plantarum," but by many authors it is split up into 3 or 4, only 2 of which, however, are represented in New Zealand. Taken in the broad sense, it is a most important and widely spread family, found in all parts of the world, but most abundant in warm or tropical regions. The genera are over 100, and the species may be fairly estimated at 1500. It includes a large number of useful plants, only a few of which can be mentioned here. Of edible species, the fig, mulberry, and bread-fruit are the most important. Of fibre-plants, the common hemp, the paper-mulberry, and the rhea (*Bœhmeria nivea*). Several species of *Ficus*, and notably *F. elastica*, yield indiarubber. *Ficus indica* is the well-known banyan. The upas-tree (*Antiaris toxicaria*) is highly poisonous. Of the 6 indigenous genera, *Urtica* and *Parietaria* are widely spread in most temperate and tropical climates; *Elatostema* and *Bœhmeria* are mainly tropical; *Paratrophis* extends to the Pacific islands and Malay Archipelago; while *Australina* is found in Australia and South Africa.

* Trees with milky sap. Flowers spiked. Fruit drupaceous; ovule pendulous 1. PARATROPHIS.

** Sap watery. Flowers solitary or glomerate or cymose. Ovule erect.

Herbs with stinging hairs. Leaves opposite. Female perianth 4-partite	2. URTICA.
Herbs. Leaves alternate. Flowers crowded on a fleshy discoid receptacle	3. ELATOSTEMA.
Trees. Leaves 3-nerved. Female perianth tubular, enclosing the fruit	4. BŒHMERIA.
Herbs, without stinging hairs. Leaves alternate. Flowers in involucrate clusters. Female perianth tubular. Stigma tufted	5. PARIETARIA.
Herbs, without stinging hairs. Leaves alternate. Flowers not involucrate. Female perianth tubular. Stigma linear	6. AUSTRALINA.

1 PARATROPHIS, Blume.

Trees with milky juice. Leaves alternate, shortly petiolate, crenate or almost entire, penninerved; stipules small, lateral, caducous. Flowers diœcious, in axillary or rarely terminal soli-

tary or geminate spikes. Male flowers: Numerous, usually closely placed. Perianth small, 4-partite; segments broad, obtuse, concave, imbricate. Stamens 4; filaments inflexed in bud; anthers didymous, 2-celled. Rudimentary ovary turbinate. Female flowers: Few and lax, or numerous and dense. Perianth very small, 4-partite; segments unequal, closely imbricate. Ovary straight, sessile, exserted, 1-celled; style deeply 2-partite; ovule solitary, pendulous. Fruit drupaceous, seated on the slightly enlarged persistent perianth, globose or ovoid, tipped by the short style; exocarp thin, fleshy; endocarp crustaceous. Seed subglobose; albumen scanty; cotyledons broad, foliaceous, conduplicate.

A small genus of 6 species, 3 of which are found in New Zealand, 2 in the Pacific islands, and 1 in the Philippines.

Leaves $\frac{1}{3}$ – $1\frac{1}{2}$ in. Female spikes $\frac{1}{4}$ – $\frac{1}{2}$ in., 3–8-flowered.

Drupe 1–3 ripening on each spike, $\frac{1}{8}$ in. diam. .. 1. *P. heterophylla*.

Leaves $1\frac{1}{2}$ – $3\frac{1}{2}$ in. Female spikes $\frac{1}{2}$ –1 in., 8–25-flowered.

Drupe usually many ripening on each spike, $\frac{1}{4}$ in. diam. 2. *P. Banksii*.

Leaves 4–8 in., entire. Female spikes 2–4 in., many-flowered; flowers in 2 rows on each side of the rachis.

Drupe $\frac{1}{3}$ in. diam. 3. *P. Smithii*.

1. *P. heterophylla*, *Bl. Mus. Bot. Lugd. Bat.* ii. 81.—A tree 15–40 ft. high, with a trunk 9–24 in. diam.; bark grey or almost white, rough with raised lenticels; branches numerous, crowded, glabrous or pubescent; those of young plants long and slender, flexuous, often interlaced, pubescent or setose at the tips, bark dark-brown. Leaves of young plants remote, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, broadly obovate to oblong-obovate, acute or obtuse, cuneate at the base, rather membranous, glabrous or pubescent, serrate, often irregularly lobed or almost pinnatifid; of mature trees $\frac{1}{3}$ – $1\frac{1}{2}$ in. long, oblong-ovate or oblong-obovate to elliptic, obtuse or acute, crenate or crenate-dentate, coriaceous, dark-green, prominently reticulate. Male spikes $\frac{1}{3}$ –1 in. long, shortly pedunculate, cylindric. Flowers closely packed, minute, sessile, intermixed with peltate scales. Perianth-segments rounded, margins ciliate. Stamens exserted. Female spikes $\frac{1}{4}$ – $\frac{1}{2}$ in. long, 3–8-flowered. Flowers lax, very minute, intermixed with peltate scales. Perianth-segments appressed to the ovary, the 2 outer rather smaller. Drupe globose, small, red, $\frac{1}{8}$ in. diam., usually 1 and seldom as many as 3 ripening on each spike.—*Epicarpurus microphyllus*, *Raoul, Choix*, 14, t. 9; *Hook. f. Handb. N.Z. Fl.* 251. *Taxotrophis microphylla*, *F. Muell. Fragm. Phyt. Austr.* vi. 193. *Trophis opaca*, *Hook. f. Fl. Nov. Zel.* i. 224 (*in part*).

NORTH AND SOUTH ISLANDS: Not uncommon in lowland forests throughout. *Turepo*; *Milk-tree*. October–February.

Abounding in milky sap, which is said to be palatable. The wood is dense and heavy, but not durable. The spikes are often diseased, and converted into large much-branched panicles densely clothed with small imbricating bracts, the flowers being altogether aborted.

2. **P. Banksii**, *Cheesem. n. sp.*—A small tree 15–25 ft. high, glabrous or the young branches pubescent; bark brown. Leaves usually close-set, spreading, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, ovate-oblong or elliptic-oblong, obtuse or acute, coriaceous, glabrous, obtusely crenate or crenate-dentate, veins finely reticulate. Spikes solitary or geminate or rarely 3 together, axillary, rarely terminal, pedunculate. Males 1–2 in. long, cylindrical, densely many-flowered; flowers intermixed with peltate scales. Perianth rather larger than in *P. heterophylla*. Female spikes $\frac{1}{2}$ –1 in. long; flowers 8–25 or more, distichous, rhachis compressed. Drupe broadly ovoid, red, $\frac{1}{4}$ in. diam., always several and often many ripening on each spike.—*P. heterophylla* var. *elliptica*, *Kirk in Trans. N.Z. Inst.* xxix. (1897) 500, t. 46. *Trophis opaca*, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i. 224.

NORTH ISLAND: Usually near the sea. Bay of Islands, *Colenso*! Whangarei Heads and Hen and Chickens Islands, *T. F. C.*; Great Barrier Island, *Omaha*, *Kirk*! Cuvier Island, *T. F. C.*; Cabbage Bay, *Adams*! East Cape district, *Banks and Solander*, *Bishop Williams*! *Petrie*! Cook Strait, *Kirk*! Stephen Island, *H. H. Travers*! November–February.

I advance this as a distinct species with considerable hesitation; but the much larger leaves, longer spikes, more numerous female flowers, and much larger and more numerous drupes are prominent characters, and although intermediates exist between it and *P. heterophylla* the two plants appear to be too wide apart to be treated as a single species.

3. **P. Smithii**, *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 148.—A perfectly glabrous shrub or small tree 6–15 ft. high, with copious milky juice; branches long, slender, straggling, often flexuous and interlaced; bark dark-brown, rough with raised lenticels. Leaves 4–8 in. long, ovate-oblong or elliptic-oblong, obtuse or obtusely acuminate, rounded or obliquely cordate at the base, quite entire, dark-green, coriaceous; veins conspicuous, reticulated; stipules lanceolate, caducous. Spikes solitary or geminate, axillary or from the branches below the leaves, 2–5 in. long. Males cylindrical, densely many-flowered; flowers intermixed with peltate scales. Perianth $\frac{1}{8}$ in. diam.; segments rounded, spreading, pubescent externally. Females many-flowered, the flowers minute, densely packed in 2 irregular rows on each side of the flattened rhachis, intermixed with peltate scales. Perianth-segments rounded, obtuse, closely appressed to the ovary, the 2 outer rather smaller than the others. Ovary conic, exserted. Style deeply 2-partite. Drupe globose, bright-red, $\frac{1}{3}$ in. diam.

NORTH ISLAND: Three Kings Islands, abundant, *T. F. C.*

Easily recognised by the large entire leaves and long many-flowered female spikes, with the flowers distichously arranged in 2 rows on each side of the rhachis.

2. **URTICA**, Linn.

Annual or perennial herbs or small shrubs, more or less armed with stinging hairs. Leaves opposite, petiolate, toothed or lobed, 3-7-nerved; stipules lateral, free or connate. Flowers small, green, monœcious or diœcious, in clusters arranged in axillary simple or branched racemes or panicles. Male flowers: Perianth deeply 4-partite; segments ovate or rounded, concave. Stamens 4, inflexed in bud. Rudimentary ovary cupuliform. Female flowers: Perianth deeply 4-partite; the 2 outer segments smaller than the inner. Ovary straight, ovoid; stigma sessile or nearly so, penicillate; ovule solitary, erect, orthotropous. Achene ovoid or oblong, compressed, enclosed in the persistent perianth. Seed erect; albumen scanty; cotyledons rounded.

Species 30 to 35, widely spread in the temperate and subtropical regions of both hemispheres, rarer in the tropics. One of the New Zealand species extends to Australia, the remaining three are endemic.

- | | |
|---|----------------------------|
| Shrubby, 3-10 ft. high. Stinging hairs copious, long, rigid. Leaves 2-5 in., narrow ovate-triangular to lanceolate.. .. | 1. <i>U. ferox</i> . |
| Herbaceous, stout, 1-3 ft. high, glabrous or nearly so. Stinging hairs few, weak. Leaves 3-6 in., ovate or orbicular-cordate | 2. <i>U. australis</i> . |
| Herbaceous, stout, 1 ft. high, pubescent with greyish-white hairs. Leaves 2-3 in., broadly ovate | 3. <i>U. Aucklandica</i> . |
| Herbaceous, slender, 1-2 ft. high, glabrous. Stinging hairs few or many, weak. Leaves $\frac{1}{2}$ -2 $\frac{1}{2}$ in., ovate-deltoid to lanceolate | 4. <i>U. incisa</i> . |

1. **U. ferox**, *Forst. Prodr.* n. 346.—A slender much-branched shrub, sometimes 6-10 ft. high with a woody trunk 3-4 in. diam. at the base, but usually from 2 to 5 ft.; stinging hairs copious, long, rigid, $\frac{1}{6}$ - $\frac{1}{4}$ in. long; branchlets, petioles, and under-surface of leaves more or less finely pubescent. Leaves on long slender petioles; blade 2-5 in. long, narrow ovate-triangular to lanceolate-triangular, acuminate, broadest at the base which is truncate or rounded or cordate and often lobed or hastate, thin and membranous; margins deeply and coarsely toothed, the teeth ending in a long rigid bristle; stipules interpetiolar, entire. Flowers diœcious, in axillary racemiform panicles 1-2 in. long. Perianth densely pubescent, females smaller than the males. Nut ovoid, compressed, about $\frac{1}{10}$ in. long. — *A. Rich. Fl. Nov. Zel.* 354; *A. Cunn. Precur.* n. 333; *Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 225; *Handb. N.Z. Fl.* 251.

NORTH AND SOUTH ISLANDS: Lowland districts from the East Cape and Kawhia southwards to eastern Otago, not common. Sea-level to 1000 ft. *Tree-nettle*; *Ongaonga*. August-December.

A very distinct species, easily recognised by the large size, woody stems, and copious stipitate stinging hairs.

2. **U. australis**, *Hook. f. Fl. Antarct.* i. 68.—Stems 1–3 ft. high, erect or decumbent at the base, stout, succulent, glabrous or sparingly clothed with short white hairs; stinging hairs few, weak, chiefly clustered at the nodes. Leaves opposite, the upper sometimes ternate; blade 3–6 in. long or even more, broadly ovate or orbicular-cordate, acute, coarsely toothed or crenate, rather fleshy, 5–7-nerved, glabrous or sparsely pubescent or setose; petiole stout, 1–4 in. long; stipules interpetiolar, large, bifid. Racemes or panicles simple or branched, axillary, longer or shorter than the petioles, the lower male and the upper female, but both sexes occasionally mixed in the same panicle. Male perianth about $\frac{1}{12}$ in. diam., glabrous or nearly so; female rather smaller. Nut ovoid, compressed, smooth, rather shorter than the persistent perianth.—*Fl. Nov. Zel.* i. 225; *Handb. N.Z. Fl.* 251.

NORTH ISLAND: "Southern extreme, *Bidwill*" (Handbook). CHATHAM ISLANDS: *H. H. Travers! Cox and Cockayne!* STEWART ISLAND: Not seen on the main island, but not uncommon on Dog Island and other small islands in Foveaux Strait, *Kirk!* ANTIPODES ISLAND: *Kirk!* AUCKLAND ISLANDS: *Sir J. D. Hooker, Kirk!* December–March.

Remarkable for its stout succulent habit and large leaves. Although reported from the North Island in the Handbook, on the authority of *Bidwill*, of late years no New Zealand botanist has met with it on any part of the mainland of either the North or South Island.

3. **U. Aucklandica**, *Hook. f. Fl. Antarct.* i. 68.—A rigid herb, everywhere pubescent with short greyish-white hairs. Stems stout, erect, angled, about 1 ft. high; stinging hairs few, chiefly clustered at the thickened nodes. Leaves opposite, spreading, 2–3 in. long, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. broad, broadly ovate, acute, usually cordate at the base, rather coriaceous, many-nerved, coarsely serrate or dentate; petioles stout, $\frac{1}{2}$ –1 in. long; stipules rather large, interpetiolar, 2-fid or 2-partite. Male flowers alone seen, in short axillary spikes. Perianth-segments 4, rounded, concave, setose on the back. Stamens 4; filaments short.—*Handb. N.Z. Fl.* 252.

AUCKLAND ISLANDS: Near the sea-beach at the margin of woods, rare, *Sir J. D. Hooker*.

I have seen no specimens of this, and the above description has been compiled from that given in the "*Flora Antarctica*." It appears to be very close to *U. australis*, differing chiefly in the smaller size and more rigid habit, and in the dense greyish-white pubescence.

4. **U. incisa**, *Poir. Encycl. Suppl.* iv. 224. — Stems slender, erect or decumbent at the base, much or sparingly branched or simple, sparsely clothed with weak stinging hairs but otherwise glabrous, 1–2 ft. high, rarely more. Leaves on long slender petioles, very variable in size and shape; blade $\frac{1}{2}$ – $2\frac{1}{2}$ in. long, broadly ovate-deltoid to lanceolate, acute or acuminate, cordate or truncate or cuneate at the base, deeply and acutely toothed, membranous;

stinging hairs few, weak. Spikes or racemes single or geminate in the axils of the upper leaves, often branched, longer or shorter than the petioles, the lower male and the upper female, or inflorescence altogether diœcious. Male perianth $\frac{1}{15}$ in. diam., glabrous or nearly so; female perianth much smaller when in flower but enlarging as the fruit ripens. Nut ovoid, compressed, rather longer than the persistent slightly enlarged perianth.—*Hook. f. Handb. N.Z. Fl.* 251; *Benth. Fl. Austral.* vi. 190. *U. lucifuga*, *Hook. f. in. Hook. Lond. Journ. Bot.* vi. (1847) 285; *Fl. Nov. Zel.* i. 225.

Var. *linearifolia*, *Hook. f. Fl. Nov. Zel.* i. 225.—Leaves very narrow-linear, $1-3\frac{1}{2}$ in. long, $\frac{1}{8}-\frac{1}{2}$ in. wide. Spikes shorter, sometimes reduced to axillary glomerules.

NORTH AND SOUTH ISLANDS: Not uncommon in shaded places, from the North Cape to Foveaux Strait. Sea-level to 4000 ft. Flowers spring and summer.

Also common in Australia and Tasmania, and very near to the northern *U. dioica* (which is sparingly naturalised in New Zealand), principally differing in the more slender habit, in not being conspicuously pubescent between the stinging hairs, and in the usually shorter spikes.

3. *ELATOSTEMA*, Forst.

Herbs, sometimes woody at the base. Leaves distichous, alternate, or if opposite one of each pair much smaller than the other, sessile or nearly so, oblique and unequal-sided; stipules lateral or intrapetiolar. Flowers very minute, densely crowded in axillary sessile or peduncled unisexual usually involucre receptacles; involucre bracts broadly oblong or ovate, nearly free or confluent below. Male flowers: Perianth 4-5-partite; segments membranous or hyaline, often spurred or tubercled on the back. Stamens 4-5, inflexed in bud. Rudimentary ovary minute. Female flowers: Perianth of 3-5 very minute segments or altogether wanting. Stamens imperfect. Ovary straight; stigma sessile, penicillate; ovule erect. Achene minute, compressed, ovoid or ellipsoid, smooth or rarely ribbed. Seed erect; albumen usually wanting; cotyledons ovate.

About 50 species are known, for the most part natives of tropical Asia and Africa, but the genus extends northwards to Japan, and southwards to New Zealand.

1. *E. rugosum*, *A. Cunn. Precur.* n. 335.—Stems stout, succulent, decumbent or prostrate and rooting at the base, erect above, sparingly branched, 1-5 ft. high. Leaves alternate, 4-10 in. long, obovate-lanceolate or lanceolate, acuminate, curved, unequal-sided, auricled and semi-amplexicaul at the sessile base, sharply serrate, membranous, rugose, pubescent with minute rigid hairs on both surfaces; stipules lanceolate, membranous, deciduous. Receptacles monœcious, solitary in the axils of the leaves, sessile or shortly pedunculate, depressed-hemispherical, often lobed, $\frac{1}{4}-\frac{1}{2}$ in.

diam. Males: Bracts broad, glabrous or puberulous. Flowers very numerous, pedicelled, hidden among the broad membranous bracteoles. Perianth 4-partite; segments abruptly acuminate, hyaline. Females with the bracts narrower and more pubescent. Bracteoles linear-spathulate, ciliate. Flowers almost sessile; perianth very minute, of 4 hyaline segments. Stigma penicillate. Achene minute, ovoid, smooth.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 227; *Handb. N.Z. Fl.* 253.

NORTH ISLAND: Damp shaded ravines from the North Cape southwards to the middle of Wellington Province, but local to the south of the Waikato River. Sea-level to 2000 ft. *Parataninoha*. Flowers spring and summer.

The heads or receptacles are usually described as unisexual, but it is not uncommon to find both sexes mixed in the same head.

4. **BCEHMERIA**, Jacq.

Shrubs or small trees. Leaves alternate or opposite, toothed, 3-nerved; stipules usually free, deciduous. Flowers monœcious or diœcious, in small globose glomerules; glomerules axillary, either solitary or spiked or racemed or panicle. Male flowers: Perianth 3-5-lobed or -partite; segments valvate. Stamens 3-5, inflexed in bud. Rudimentary ovary clavate or globose. Female flowers: Perianth tubular, compressed or ventricose, mouth often contracted, 2-4-toothed. Ovary included, sessile or stipitate; stigma filiform, persistent; ovule solitary, erect. Achene closely invested by the persistent perianth, crustaceous. Seed albuminous; cotyledons ovate or elliptic.

Species about 50, widely spread through the tropics of both hemispheres.

1. **B. dealbata**, *Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 410. —A small tree 8-25 ft. high; branches terete, pubescent with minute appressed hairs. Leaves alternate, 3-6 in. long, ovate or ovate-lanceolate, acuminate, rounded at the base, rarely slightly cordate, obtusely serrate, prominently 3-nerved and with the secondary veins also strongly marked, green and glabrous and rugulose above, white and hoary beneath; petioles stout, $\frac{3}{4}$ -2 in. long, grooved on the upper surface. Flowers minute, in small axillary sessile glomerules, which are either unisexual or androgynous. Male flowers: Perianth deeply 4-partite; segments oblong-ovate, acuminate, clothed with erect hairs. Stamens exserted. Females: Perianth tubular, dilated below, contracted at the 2-toothed mouth. Stigma exserted, long, filiform, hirsute. Fruiting-perianth much compressed, broadly winged. Achene very minute, ovoid, quite smooth.

KERMADEC ISLANDS: Sunday Island, not uncommon at low elevations. Flowers most of the year.

Nearly intermediate in characters between the Norfolk Island *B. australis* and the Lord Howe Island *B. calophleba*, but apparently distinct from both.

5. **PARIETARIA**, Tourn.

Annual or perennial herbs. Leaves alternate, petiolate, quite entire, 3-nerved; stipules wanting. Flowers polygamous, in axillary cymes or glomerules, sessile, bracteate. Male flowers (often hermaphrodite): Perianth deeply 3-4-partite; segments valvate. Stamens 3-4, inflexed in bud. Female flowers: Perianth tubular at the base, 3-4-lobed. Ovary free within the perianth; stigma recurved, penicillate; ovule solitary, erect. Achene enclosed in the variously enlarged persistent perianth, crustaceous. Seed albuminous; cotyledons oblong or ovate.

A small genus of 7 or 8 species, generally distributed in both temperate and tropical regions. The single New Zealand species has almost the range of the genus.

1. **P. debilis**, *Forst. Prodr.* n. 387.—A slender flaccid more or less pubescent diffusely branched annual herb 6-18 in. high. Leaves on long slender petioles; blade $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, broadly ovate or ovate-cordate, obtuse or obtusely acuminate, thin and membranous, quite entire, green on both surfaces, 3-nerved from the base. Cymes 3-7-flowered, almost contracted into sessile clusters; bracts linear, shortly united at the base. Hermaphrodite (or male) flowers usually in the fork of the cyme; perianth almost unchanged in fruit. Female flowers lateral; perianth evidently enlarged in fruit. Achene very minute, dark-brown, quite smooth.—*A. Rich. Fl. Nouv. Zel.* 354; *Hook. f. Fl. Nov. Zel.* i. 226; *Handb. N.Z. Fl.* 252; *Benth. Fl. Austral.* vi. 188. *Urtica debilis*, *Endl. Prodr. Fl. Norfolk.* 37; *A. Cunn. Precur.* n. 334; *Raoul, Choix*, 42.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant as far south as middle Otago. Sea-level to 2500 ft. Flowers spring and summer.

6. **AUSTRALINA**, Gaud.

Diffuse or creeping annual or perennial herbs. Leaves alternate, petiolate, crenate-toothed or almost entire; stipules lateral, free. Flowers monœcious, in few-flowered axillary glomerules; glomerules unisexual or androgynous. Male flowers: 1-5 together at the summit of a common peduncle. Perianth irregularly bilabiate, the outer lip inflexed in bud. Stamen solitary. Rudimentary ovary wanting. Female flowers solitary or few together, sessile. Perianth ovoid-tubular, mouth contracted and obscurely toothed. Ovary free within the perianth; stigma linear, villous; ovule erect from the base. Achene enclosed in the persistent perianth; pericarp thin, shining. Seed with scanty albumen; cotyledons ovate.

A small genus of 6 species, 2 found in Australia, 1 of them extending to New Zealand, and 4 natives of South Africa and Abyssinia.

1. **A. pusilla**, *Gaud. in Freyc. Voy. Bot.* 505. — Stems very slender, creeping and rooting, much and often intricately branched, 3–12 in. long, more or less pubescent. Leaves $\frac{1}{6}$ – $\frac{1}{2}$ in. long, broadly ovate or orbicular or broader than long, rounded at the tip, cuneate or almost truncate at the base, obtusely crenate, thin and membranous, pubescent on both surfaces; petiole as long or longer than the blade. Male flowers 2–3 together or solitary; peduncle variable in length, sometimes exceeding the petiole. Perianth irregularly bilabiate, green, membranous, hispid. Stamen large, exserted. Female flowers solitary or 2–3 together, each on a very short peduncle or sessile, in the same or in a different axil to the male inflorescence. Perianth very minute, flask-shaped, 2–3-toothed at the constricted mouth. Style exserted, villous.—*Handb. N.Z. Fl.* 252; *Benth. Fl. Austral.* vi. 189. *A. novæ-zealandiæ*, *Hook. f. Fl. Nov. Zel.* i. 226. *A. hispidula*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 266.

NORTH AND SOUTH ISLANDS: Dark shaded woods from Hokianga and the Bay of Islands to Foveaux Strait, but often very local. Sea-level to 1000 ft.

ORDER LXXVII. CUPULIFERÆ.

Trees or shrubs. Leaves alternate, penninerved, entire or toothed or lobed, never compound; stipules present, free, often caducous. Flowers usually monœcious. Males in erect or pendulous spikes (catkins) sometimes shortened into globular or capitate clusters. Perianth of 1–5 free or connate segments or wanting. Stamens 2–20, inserted on a torus or at the base of the perianth-segments; filaments slender; anthers 2-celled. Female flowers less numerous than the males, solitary or in few-flowered catkins or clusters, often surrounded by scales or bracts which are frequently united into an entire or lobed involucre. Perianth adnate to the ovary or wanting, limb minute, annular or toothed. Ovary inferior, 2–6-celled; styles as many as the cells, stigmatic in the upper part; ovules 1 or 2 in each cell, pendulous, anatropous. Fruit a nut, enclosed or seated within the persistent and hardened enlarged involucre. Seed usually solitary in each nut; albumen wanting; embryo with large and fleshy cotyledons, radicle superior.

An important order, including 10 genera and about 400 species, for the most part confined to the Northern Hemisphere, and most abundant in the temperate zone, extending southwards to the mountains of the Malay Archipelago and Central America and Colombia, a very few species of one genus alone found in the south temperate zone. The order includes the oak, chestnut, beech, hazel, hornbeam, birch, &c., and produces some of the most durable and valuable woods known. The single New Zealand genus occurs in the temperate regions of both hemispheres.

1. **FAGUS**, Linn.

Trees or rarely shrubs. Leaves evergreen or deciduous; stipules caducous. Flowers monœcious. Males: In pendulous few- or many-flowered heads or solitary; bracts scale-like, caducous. Perianth campanulate, 4-6-lobed; lobes imbricate. Stamens 8-16 or more; filaments filiform, exserted; anthers oblong, obtuse or sagittate at the base, loculicidally dehiscent. Females: Minute, 2-4 sessile within a 4-lobed involucre composed of numerous scales grown together at the base. Perianth-tube trigonous, adnate to the ovary; limb shortly 3-5-lobed. Ovary inferior, 3-celled; styles 3, linear; ovules 2 in each cell, pendulous from the top. Fruiting involucre enlarged and hardened, more or less clothed externally with scales or prickles, ultimately splitting almost to the base into 4 (rarely 3) valves. Nuts enclosed within the involucre, trigonous, 3-celled; cells 1-seeded. Seed pendulous; cotyledons plaited.

A genus of about 18 species, found in the temperate and colder regions of both the Northern and Southern Hemispheres. It is now often divided into two separate genera: one, *Fagus* proper, including the beeches of the Northern Hemisphere, which have comparatively large leaves, many-flowered male heads or catkins, and large fruiting involucre; the other, *Nothofagus*, comprising the species from the Southern Hemisphere, in all of which the leaves are small, the male heads 1-3-flowered, and the fruiting involucre very small indeed.

A. Fruiting involucre clothed with recurved linear processes.

Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., ovate-rhomboid, coriaceous, doubly crenate 1. *F. Menziesii*.

B. Fruiting involucre with flat transverse lamellæ.

Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., broadly ovate, obtuse, thin, veined, pubescent, deeply serrate 2. *F. fusca*.

Leaves $\frac{3}{4}$ -1 in., oblong, apiculate, entire or obscurely toothed towards the tip 3. *F. apiculata*.

Leaves $\frac{3}{4}$ - $\frac{3}{2}$ in., ovate, acute, entire, glabrous above, fulvous beneath. Involucre 4-valved 4. *F. Blairii*.

Leaves $\frac{1}{4}$ - $\frac{3}{4}$ in., oblong, obtuse, entire, glabrous above, white beneath. Involucre 3-valved 5. *F. Solandri*.

Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., ovate, acute, rounded or cordate at the base, glabrous above, white beneath. Involucre 3-valved 6. *F. cliffortioides*.

1. **F. Menziesii**, Hook. f. in Hook. Ic. Plant. t. 652.—A tall forest-tree 60-80 ft. or even 100 ft. high; trunk 2-5 ft. diam. or more; bark white and silvery, especially in young trees; branchlets clothed with fulvous pubescence. Leaves evergreen, shortly petiole, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, broadly ovate-deltoid or rhomboid or almost orbicular, obtuse, shortly unequally cuneate at the base, thick and coriaceous, rigid, glabrous except the petiole, irregularly doubly crenate; margins thickened; stipules membranous, reddish, pubescent. Male flowers solitary, on short curved peduncles in the lower axils of the branchlets. Perianth 4-6-lobed. Stamens 6-12. Female involucre in the upper axils, 2-3-flowered. Fruiting involucre $\frac{1}{4}$ - $\frac{1}{3}$ in. long, faintly pubescent; lobes with 5-7 trans-

verse rows of recurved linear processes tipped with an obtuse gland. Nuts puberulous, 3- or more rarely 2-winged, wings produced upwards into sharp flat points.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 229; *Handb. N.Z. Fl.* 249; *Kirk, Forest Fl.* t. 89. *Nothofagus Menziesii*, *Oerst. in Vidensk. Selsk. Skr.* v. ix. (1873) 355.

NORTH ISLAND: Mountain forests from the Thames goldfields southwards, but rare and local to the north of the East Cape. SOUTH ISLAND: Hilly and mountain forests from Nelson to Foveaux Strait, most plentiful on the west side of the island. Sea-level to 3500 ft. *Tawhai*; *Tawai*; *Silver-birch*; *Red-birch*. November–January.

Easily distinguished by the rigid doubly toothed leaves and recurved glandular processes on the fruiting involucre. The wood is dark-red, strong and compact, and easily worked, but is not durable when exposed to the weather. It has been recommended for furniture, tubs and buckets, wine-casks, &c., but is not largely used at the present time.

It is worth remarking that the tips of the branches are sometimes diseased and converted into much-branched paniculate masses clothed with fulvous imbricating scales, closely resembling a paniculate inflorescence in young bud. On the under-surface of the leaves, at the junction of the main veins with the midrib, there are usually 1–3 curious fringed pits or domatia, very similar to those on the leaves of certain *Coprosmas*.

2. **F. fusca**, *Hook. f. in Hook. Ic. Plant.* t. 631.—A noble forest-tree 60–100 ft. high; trunk 4–8 ft. diam.; bark dark-brown or black in old plants, deeply furrowed, smooth and greyish-white on young trees; branchlets and petioles pubescent. Leaves evergreen, petiolate, $\frac{3}{4}$ –1½ in. long, broadly ovate or ovate-oblong, obtuse or rarely acute, cuneate at the base, rather thin but firm, pubescent above and glandular beneath when young, glabrous when old, deeply and sharply serrate, veins conspicuous; stipules linear-oblong, caducous. Male flowers 2–3 at the end of a short curved axillary peduncle or more rarely solitary, drooping. Perianth 5-toothed, membranous, pubescent. Stamens 8–16. Female involucre solitary in the upper axils, 2–3-flowered. Fruiting involucre $\frac{1}{3}$ –½ in. long, ovoid-globose, viscid-pubescent, 4-lobed; lobes furnished at the back with 3–5 transverse lamellæ with entire or fringed margins. Nuts pubescent, 2–3-winged, wings produced upwards into entire or toothed points.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 229; *Handb. N.Z. Fl.* 249; *Kirk, Forest Fl.* t. 90. *Nothofagus fusca*, *Oerst. in Vidensk. Selsk. Skr.* v. ix. (1873) 355.

Var. **Colensoi**, *Hook. f. Fl. Nov. Zel.* i. 229.—Leaves more coriaceous, teeth smaller, obtuse.—*Ic. Plant.* t. 630; *Kirk, Forest Fl.* t. 90, f. 2. *F. truncata*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 280.

NORTH ISLAND: In forests from Mongonui and Kaitaia southwards, but local to the north of the East Cape. SOUTH ISLAND: From Nelson to Foveaux Strait, but rare in Canterbury and eastern Otago. Sea-level to 3500 ft. *Tawhai*; *Tawhai-rau-nui*; *Black-birch*; *Red-birch*. October–December.

A magnificent tree, undoubtedly the finest representative of the genus in New Zealand, and well marked off by the comparatively thin veined leaves with sharply toothed margins. Wood dark-red, strong and compact, more durable than that of the other species, and frequently used for wharves, bridges, fencing-posts, &c.

3. *F. apiculata*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 335.—A tall handsome tree 40 ft. high or more; trunk 2 ft. diam.; bark pale, smooth; branchlets pubescent. Leaves petiolate, $\frac{3}{4}$ –1 in. long, oblong or ovate-oblong or elliptic-oblong, apiculate, cuneate at the base, rather thin, glabrous, quite entire or minutely or irregularly crenulate, veins not very conspicuous; stipules membranous, linear-oblong. Male flowers 1 or rarely 2 at the end of a short axillary peduncle, drooping. Perianth campanulate, membranous, 5-toothed. Stamens 8–14. Female involucre solitary in the axils of the leaves above the male inflorescence, 2–3-flowered. Fruiting involucre $\frac{1}{4}$ – $\frac{1}{3}$ in. long, narrow-ovoid, pubescent, 4-lobed; lobes with 2–4 transverse lamellæ. Nuts pubescent, 2–3-winged, wings produced upwards into entire points.—*Kirk, Forest Fl.* t. 135.

Var. *dubia*.—Leaves more coriaceous, oblong or oblong-obovate, obtuse or rarely apiculate, slightly pubescent beneath, upper half obscurely toothed or sinuate.—*F. fusca*, var. *dubia* and var. *obsoleta*, *Kirk, Forest Fl.* t. 91.

NORTH ISLAND: Hawke's Bay—Forests near Dannevirke and Norsewood, *Colenso*! Var. *dubia*: Mungaroa and other localities near Wellington, *Kirk*! November–December.

Very closely related to *F. fusca*, but I think sufficiently distinct in the smaller and narrower leaves which in the typical form are distinctly apiculate and either quite entire or very minutely crenulate, and in the smaller and narrower involucre. Var. *dubia* was placed under *F. fusca* by Kirk, and it certainly approaches var. *Colensoi* of that species; but, on the whole, appears to be nearer to *F. apiculata*.

4. *F. Blairii*, *T. Kirk in Trans. N.Z. Inst.* xvii. (1885) 297.—A tall tree 40–60 ft. high; trunk 2–3 ft. diam.; branchlets and petioles pubescent. Leaves petiolate, spreading, $\frac{2}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, ovate, acute or apiculate, rounded at the base, quite entire, coriaceous, glabrous above, beneath clothed with fulvous appressed tomentum. Flowers not seen. Fruiting involucre $\frac{1}{4}$ – $\frac{1}{3}$ in. long, ovoid, glabrous, 4-lobed; lobes with 3–4 membranous transverse lamellæ. Nuts 3-winged, broad at the base, narrowed above.—*Forest Fl.* t. 57.

NORTH ISLAND: Forests near the source of the Wanganui River, *Kirk*!
SOUTH ISLAND: Nelson—Wairau Valley, Buller Valley, Little Grey River, *Kirk*!
Otago—Five-fingers Plain, *W. N. Blair*; Martin's Bay, *Buchanan*; Lake Wakatipu, Valley of the Dart, *Kirk*! 1000–2500 ft.

An imperfectly known plant, apparently differing from *F. Solandri* in the broader ovate apiculate leaves, fulvous pubescence, and 4-valved fruiting involucre. Some specimens without flower or fruit, collected by Petrie near Arrowtown, Otago, agree with *F. Blairii* in the thick fulvous pubescence on the under-surface of the leaves, but the leaves are more oblong and obscurely toothed or sinuate, much as in *F. apiculata* var. *dubia*.

5. **F. Solandri**, *Hook. f. in Hook. Ic. Plant.* t. 639.—A lofty forest-tree 40–80 ft. high; trunk 2–5 ft. diam.; bark black and furrowed on old trees, pale and smooth on young ones; branchlets closely pubescent. Leaves evergreen, shortly petiolate, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-oblong to elliptic-oblong, obtuse, cuneate and usually unequal-sided at the base, quite entire, coriaceous, glabrous and reticulated above, clothed with appressed greyish-white pubescence beneath, margins recurved; stipules membranous, caducous. Male flowers axillary, either solitary or 2–3 on a short common peduncle. Perianth broad and shallow, cup-shaped, shortly 4–5-toothed. Stamens 8–15. Female involucre solitary in the upper axils, sessile, 2–3-flowered. Fruiting involucre $\frac{1}{4}$ in. long, ovoid, glabrous or pubescent, usually 3-lobed; lobes with three membranous transverse lamellæ. Nuts 2–3-winged, broad at the base, narrowed above.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 230; *Handb. N.Z. Fl.* 250; *Kirk, Forest Fl.* t. 56. *Nothofagus Solanderi*, *Oerst. in Vidensk. Selsk. Skr.* v. ix. (1873) 355.

NORTH AND SOUTH ISLANDS: Forests from the East Cape to the south of Otago, usually in hilly or mountain districts. Sea-level to 2500 ft. *Tawhai*; *Tawhai-rauriki*; *Black-birch*; *White-birch*. November–December.

Wood pale-red, often streaked with black, not durable unless taken from fully mature trees. Young trees often have the leaves distichously arranged, with the under-surface glabrous or nearly so.

6. **F. cliffortioides**, *Hook. f. in Hook. Ic. Plant.* t. 673 and t. 816B.—A small tree, usually from 20 ft. to 40 ft. high, rarely more, with a trunk 1–2 ft. diam., in alpine localities often dwarfed into a much-branched bush 5–12 ft. high. Branches spreading, often distichous, especially in young trees; branchlets densely pubescent. Leaves shortly petiolate, distichous, $\frac{1}{6}$ – $\frac{2}{3}$ in. long, ovate-oblong or ovate or ovate-orbicular, acute or subacute, rarely obtuse, always broadest at the unequally rounded or almost cordate base, quite entire, very coriaceous, glabrous and reticulated above, more or less clothed with greyish-white appressed hairs beneath; margins thickened, often recurved; stipules membranous, caducous. Male flowers axillary, solitary or in pairs on very short peduncles, often very abundantly produced. Perianth broad, cup-shaped, shortly 4–5-toothed. Stamens 8–15. Female involucre solitary and sessile in the upper axils, 2–3-flowered. Fruiting involucre $\frac{1}{6}$ – $\frac{1}{4}$ in. long, ovoid, pubescent, 3-lobed; lobes with two or three transverse fringed lamellæ. Nuts 2–3-winged, ovoid, acute.—*Raoul, Choix*, 42; *Hook. f. Fl. Nov. Zel.* i. 230; *Handb. N.Z. Fl.* 250; *Kirk, Forest Fl.* tt. 101, 101A. *Nothofagus cliffortioides*, *Oerst. in Vidensk. Selsk. Skr.* v. ix. (1873) 355.

NORTH ISLAND: Mountain districts from the East Cape and Tongariro southwards. SOUTH ISLAND: Abundant in the mountains throughout, usually forming the greater portion of the subalpine forests. Altitudinal range from 2000 ft. to 4500 ft., but descending to sea-level in the sounds on the south-west coast of Otago. *Tawhai-rauriki*; *Mountain Beech* or *Birch*. December–January.

Closely allied to *F. Solanári*, but much smaller, with the leaves truly ovate, broadest at the base, and usually acute at the tip. Wood very similar to that of *F. Solandri*.

ORDER LXXVIII. CONIFERÆ.

Resinous trees or shrubs, almost always evergreen. Leaves opposite or whorled or alternate, solitary or fascicled within membranous sheaths, rigid, subulate or linear or scale-like, rarely broad and flat. Flowers monœcious or diœcious; males usually solitary, catkin-like, deciduous; females often cone-like. Perianth always wanting in both sexes. Male flowers reduced to the stamens only, which are usually numerous; filaments connate into an oblong or cylindrical central axis (staminal column); anthers placed around the axis, stipitate or sessile; cells 2 or more, either adnate to the back of the connective, or pendulous from its scale-like or peltate summit. Female flowers of one or more erect or reversed naked ovules, without ovary style or stigma, sessile on a scale (open carpellary leaf or carpidium) which is free or adnate to a bract; scales rarely solitary, usually several or many, in the latter case forming a cone or head. Fruit composed of the enlarged hardened or succulent scales or bracts, between which the seeds are hidden; or the mature seed may be exserted beyond the unchanged or fleshy scales or bracts. Seeds winged or wingless; testa thick or thin, membranous or crustaceous or fleshy; albumen copious, fleshy or farinaceous; embryo straight, axile, cotyledons 2 or more, radicle terete.

A large and important order, almost worldwide in its distribution, but most abundant in the temperate part of the Northern Hemisphere; rare in the tropics, except on high mountains; fairly well represented in the south temperate zone. Genera 33; species about 350. Many of the species yield valuable timber. Pines, firs, larches, cedars, cypresses in the Northern Hemisphere; the kauri, totara, rimu, Huon pine, &c., in the Southern, are well-known timber-trees, of great economic and commercial value. The mammoth tree of California (*Sequoia gigantea*) is probably the largest known tree. One has been measured 400 ft. high, with a trunk 116 ft. in circumference. The resinous products of the order are also of great importance. The most valuable are tar, turpentine, pitch, and kauri-gum. The 5 genera found in New Zealand are all widely distributed in the Southern Hemisphere, and one of them (*Podocarpus*) advances as far north as China and Japan.

A. Female flowers cone-like. Seeds concealed by the overlapping scales of the cone.

Leaves large, flat, oblong.	Cones large, 2-3 in. diam.;	
scales and seeds many	.. .. .	1. AGATHIS.
Leaves small, scale-like.	Cones small; scales 4-6; seeds	
2-4 .. .. .	.. .. .	2. LIBOCEDRUS.

B. Female flowers not cone-like. Seed nut-like, exserted beyond the unchanged or enlarged and fleshy scales.

Leaves small, linear and flat or scale-like.	Peduncle of	
fruit, together with the bracts, usually fleshy and en-		
larged. Ovule reversed	.. .. .	3. PODOCARPUS.

- Leaves usually dimorphic, of mature trees small and scale-like. Peduncle of fruit dry or fleshy. Ovule at first reversed but ultimately erect. Seed seated in a membranous or fleshy aril 4. DACRYDIUM.
- Branchlets expanded into broad and flat coriaceous leaf-like cladodes. True leaves reduced to minute scales. Ovule erect 5. PHYLLOCLADUS.

1. AGATHIS, Salisb.

Evergreen monœcious or diœcious trees, often of great size. Leaves subopposite or alternate, broad, flat, coriaceous; nerves parallel. Male flowers solitary, axillary, peduncled; peduncle furnished with imbricate scales at the top. Anthers densely spirally arranged on a cylindrical column; cells 5–15, pendulous from the top of a rigid stipes. Female cones terminating short branchlets, broadly ovoid or globose; scales densely spirally arranged, tips broad. Ovules solitary or rarely 2 at the base of each scale and adnate to it, reversed. Mature cone globose or nearly so; scales closely imbricating and appressed, broad, flattened, hard but scarcely woody. Seeds 1 to each scale, very rarely 2, reversed, compressed, ovate or oblong; testa thin, produced into a membranous wing; albumen fleshy; cotyledons 2.

A genus of 6 or 7 species of timber-trees, ranging through the Malay Archipelago, north-east Australia, the Pacific islands, and New Zealand. The New Zealand species is endemic, although stated by Parlatore (*D.C. Prodr.* xvi. 2, 376) and Eichler (*Natürlichen Pflanzenfamilien* ii. 1, 67) to occur in Australia.

1. *A. australis*, Salisb. in *Trans. Linn. Soc.* viii. (1807) 312.—A lofty forest-tree, with a straight columnar trunk and rounded somewhat bushy head, highly resiniferous in all its parts, usually ranging from 80 to 100 ft. high, with a trunk 4–10 ft. diam., but attaining an extreme height of 150 ft., with a trunk 15–22 ft. diam.; bark glaucous-grey, deciduous, falling off in large flat flakes. Leaves subopposite or alternate, sessile, very thick and coriaceous; of young trees lanceolate, 2–4 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, gradually passing into those of mature trees, which are $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, linear-oblong or narrow obovate-oblong, obtuse. Flowers monœcious; males $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, cylindrical. Female cones obovoid in the flowering stage, becoming almost spherical when ripe, erect, 2–3 in. diam.; scales broad, flat, rather thin, falling away from the axis at maturity. Seeds 1 to each scale, ovate, compressed, winged.—*Kirk, Forest Fl.* tt. 79 to 81. *Dammara australis*, Lamb. *Pin.* ed. i. 2, 14; *A. Cunn. Precur.* n. 325; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 231; *Handb. N.Z. Fl.* 256. *Podocarpus zamiaefolius*, A. Rich. *Fl. Nouv. Zel.* 360.

NORTH ISLAND: Abundant in forests from the North Cape to Tauranga and Kawhia. Sea-level to 2000 ft. *Kauri*, of the resin *kapia*.

The kauri-pine, too well known to require any detailed account. Timber not excelled by any other for the variety of uses for which it is adapted, and remarkable for its strength, durability, and the ease with which it is worked. The resin, or "kauri-gum," so important for varnish-making, is still dug in large quantities on the sites of previous forests, or obtained from those still living.

2. *LIBOCEDRUS*, Endl.

Usually tall trees. Leaves opposite, small and scale-like, quadrifariously imbricate, either all equal and decussate, or flattened on the branchlets, the lateral larger and keeled, those on the upper and lower faces of the branchlets smaller and flat. Flowers monœcious or diœcious; males terminal, solitary, oblong or ovoid or almost globose, consisting of a staminal column sessile within the uppermost leaves and bearing several or many decussately placed anthers; connective scale-like, ovate, subpeltate; anther-cells usually 4, pendulous. Female cones oblong or ovoid, terminating short branchlets; scales 4 or 6, decussately opposite, the lowest pair smallest and sterile, the second pair with 2 erect collateral ovules at the base of each scale, the third pair when present sterile and connate. Scales of the mature cones persistent, gaping, indurated, mucronate or horned at the back towards the tip. Seeds solitary or rarely 2 at the base of each fertile scale, compressed, unequally winged.

A small genus of 9 species, with a very singular distribution, 1 being found in California, 2 in Chili, 2 in New Zealand, and 1 each in New Caledonia, New Guinea, China, and Japan.

Branchlets of mature trees more or less compressed, not tetragonous. Cones $\frac{1}{2}$ in. long	..	..	..	1. <i>L. Doniana</i> .
Branchlets of mature trees always tetragonous. Cones $\frac{1}{4}$ – $\frac{1}{2}$ in. long	..	..	..	2. <i>L. Bidwillii</i> .

1. *L. Doniana*, Endl. *Syn. Conif.* 43.—A tall forest-tree 30 to 70 ft. high or more, with a narrow tapering head; trunk 2–4 ft. diam.; bark stringy, falling off in long ribbons. Branchlets distichous; of young trees vertical, much flattened and compressed, $\frac{1}{5}$ – $\frac{1}{4}$ in. broad; of old trees horizontal, less compressed, but not obviously tetragonous, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad. Leaves quadrifarious, the lateral larger, especially on young trees, where they are often $\frac{1}{2}$ in. long, sheathing and connate at the base, spreading, acute; those on the upper and lower faces of the branchlets $\frac{1}{25}$ – $\frac{1}{12}$ in. long, triangular, appressed to the branch. Male flowers about $\frac{1}{4}$ in. long, hardly broader than the branch; anthers 8–12; connective thin, ovate, subpeltate. Female cones ovoid, about $\frac{1}{2}$ in. long, woody; scales 4, spreading, each with a sharp curved spine at the back. Seeds 2 to each cone.—*Hanab. N.Z. Fl.* 256; *Kirk, Forest Fl.* t. 82. *Thuya Doniana*, *Hook. in Lond. Journ. Bot.* i. (1842) 571; *Hook. f. Fl. Nov. Zel.* i. 231. *Dacrydium plumosum*, *D. Don. in Lamb. Pin. ed. ii. App.* 143; *A. Cunn. Precur.* n. 330.

NORTH ISLAND: In forests from Mongonui southwards to Hawke's Bay and Taranaki, but often rare and local. Sea-level to 2000 ft. *Kawaka*; *New Zealand Arbor-vitæ*.

Wood dark-red, beautifully grained, said to be durable, but on account of its scarcity little used. Very young seedlings have narrow linear-subulate leaves spreading on all sides, but these soon pass into the quadrifarious stage.

2. *L. Bidwillii*, Hook. f. *Handb. N.Z. Fl.* 257.—Very similar to *L. Doniana*, but usually smaller, seldom more than 50 ft. high, with a trunk $1\frac{1}{2}$ –3 ft. diam., in subalpine or cool peaty localities often reduced to a fastigiate bush or small tree 10–20 ft. high. Branchlets of young trees closely resembling those of *L. Doniana*, but rather narrower; of mature trees tetragonous, $\frac{1}{15}$ – $\frac{1}{12}$ in. diam., densely clothed with almost uniform triangular acute closely appressed leaves. Female cones like those of *L. Doniana*, but smaller, $\frac{1}{4}$ – $\frac{1}{3}$ in. long.—*Kirk, Forest Fl.* t. 83.

NORTH AND SOUTH ISLANDS: From Te Aroha Mountain and Mount Egmont southwards to Foveaux Strait, not uncommon in hilly or mountain forests. 800–4000 ft. *Pahautea*; *Cedar*.

Often confounded with the previous species, but the obviously tetragonous branchlets of the mature tree, with almost uniform leaves, are characteristic and readily distinguish it. Wood soft, red, straight in the grain, easily split, and apparently of great durability, but of low specific gravity and somewhat brittle.

3. **PODOCARPUS**, L'Herit.

Trees or shrubs. Leaves alternate or opposite, scattered or imbricate or distichous, very diverse in size and shape. Flowers diœcious or rarely monœcious; males solitary or in fascicles of 2–5, or laxly spicate along an elongated rhachis, usually stipitate, the stipes furnished with imbricate bracts. Staminal column elongate, cylindric; anthers sessile, densely spirally crowded; cells 2, parallel, dehiscing longitudinally; connective usually prolonged into a short claw. Female flowers solitary or occasionally geminate, very rarely spicate; bracts or scales few, adnate with the rhachis into a swollen fleshy or succulent peduncle or “receptacle”; ovuliferous scale springing from the receptacle, ovoid, fleshy, bearing a single reversed ovule. Seeds globose or ovoid, seated on the enlarged receptacle, drupaceous or nut-like. Cotyledons 2.

About 60 species are known, scattered through the tropical and subtropical regions of the Old World, from Japan and China southwards to New Zealand and South Africa, also in most parts of South America; wanting in Europe, North America, North Africa, and western Asia. The New Zealand species are all endemic.

A. *Flowers axillary.*

* Male flowers solitary or 2–4 at the tip of a common peduncle.

Tree 40–100 ft.; bark thick. Leaves $\frac{1}{2}$ –1 in., linear, rigid
and coriaceous, pungent. Male flowers sessile. Nut
small, obtuse 1. *P. Totara*.

- Tree 25–60 ft.; bark thin, papery. Leaves $\frac{3}{4}$ – $1\frac{1}{2}$ in., linear, rigid and coriaceous, pungent. Male flowers evidently stalked. Nut acute 2. *P. Hallii*.
 Erect shrub 3–10 ft.; branches slender. Leaves lax, $\frac{1}{3}$ –1 in. long, narrow-linear, pungent, thin 3. *P. acutifolius*.
 Diffuse or prostrate shrub 2–8 ft.; branches stout. Leaves close-set, $\frac{1}{4}$ – $\frac{2}{3}$ in., linear-oblong, obtuse, thick and coriaceous 4. *P. nivalis*.
 Tree 50–80 ft. Leaves distichous, $\frac{1}{2}$ – $\frac{3}{4}$ in., linear, acute, falcate. Fruit large, broadly oblong, succulent, $\frac{3}{4}$ in. long 5. *P. ferrugineus*.

** Male flowers numerous, spiked.

- Tree 40–80 ft. Leaves distichous, $\frac{1}{3}$ – $\frac{1}{2}$ in., linear, obtuse. Fruit globose, succulent, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. 6. *P. spicatus*.

B. Flowers terminating the branchlets.

- Tree 80–120 ft. Leaves of young trees distichous, $\frac{1}{4}$ in.; of mature plants imbricate all round, $\frac{1}{12}$ – $\frac{1}{8}$ in., subulate-lanceolate, acuminate 7. *P. dacrydioides*.

1. *P. Totara*, *D. Don. in Lamb. Pin. ed. ii. (1832) 189.*—A lofty forest-tree 40–80 ft. or even 100 ft. high; trunk 2–6 ft. diam.; bark thick, furrowed, stringy and papery, capable of removal in large sheets. Leaves dull brownish-green, spreading on all sides or obscurely distichous, $\frac{1}{2}$ –1 in. long, linear, straight or slightly falcate, acute, pungent, rigid and coriaceous, midrib obscure. Flowers diœcious. Males $\frac{1}{2}$ – $\frac{3}{4}$ in. long, stout, obtuse, axillary, solitary or 2–3 together at the top of a very short stout peduncle or almost sessile; each flower with 4 bracts at the base. Anthers numerous, crowded; connective toothed at the tip. Female flowers axillary, solitary or geminate at the top of a short swollen peduncle. Fruit ovoid-oblong, rounded at the tip; peduncle usually much enlarged, red, succulent; but occasionally dry and shrivelled.—*A. Cunn. Precur. n. 328; Raoul, Choix, 41; Hook. in Lond. Journ. Bot. i. 572, t. 19; Hook. f. Fl. Nov. Zel. i. 233; Handb. N.Z. Fl. 258; Kirk, Forest Fl. t. 115. Pilger, Pflanzenreich, iv. 5, 84. P. Bidwillii, Hoibrenk ex Endl. Conif. 213. P. Cunninghamii, Col. Visit to Ruahine Range, 58.*

NORTH AND SOUTH ISLAND: Common in forests from the North Cape to the south-east of Otago. Sea-level to 2000 ft. *Totara*.

A magnificent tree, scarcely less valuable than the kauri; but, unlike it, generally distributed throughout the colony. Wood red, straight-grained, compact, extremely durable, much used for all kinds of building purposes and constructive works. From its power of resisting the attacks of the teredo it is particularly valuable for the piles of wharves, &c. The huge war-canoes of the Maoris, which were often over 80 ft. in length, were carved from the trunks of totara-trees, and it was also the favourite timber for their carved houses.

2. *P. Hallii*, *T. Kirk, Forest Fl. t. 9, 9A.*—Very closely allied to *P. Totara*, and perhaps a mere variety, but smaller, 25–60 ft. high; trunk rarely exceeding 3 ft. diam.; bark thin, papery;

branches of young trees weak, slender. Leaves of young plants usually distichous, spreading, 1-1½ in. long, narrow linear-lanceolate; of mature trees inserted all round the branches, close-set, ¾-1 in. long, linear or linear-lanceolate, acute, pungent, rigid and coriaceous, midrib somewhat prominent beneath. Flowers diœcious. Male flowers as in *P. Totara*, but usually solitary and distinctly peduncled. Female flowers frequently geminate on the short peduncle. Fruit narrow-ovoid, pointed; peduncle usually enlarged and succulent.—*P. Totara* var. *Hallii*, *Pilger*, *Pflanzenreich*, iv. 5, 84.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In forests from Kaitaia and Mongonui southwards, not uncommon. Sea-level to 3500 ft.

I am very doubtful as to this being more than a variety of *P. Totara*, which is the view held by Dr. Pilger. Young plants are easily distinguished by the weak and often flexuous branches and larger leaves; but it must be confessed that the mature foliage so closely resembles that of *P. Totara* that it is often difficult to separate the two plants by that character alone. The thin papery bark is, however, unmistakable. I fear that the shape of the fruit and the length of the peduncle of the male flower are subject to variation. The wood is similar to that of *P. Totara*, but is said to be inferior in durability. Mr. Kirk suggests that Colenso's *P. Cunninghamii* may be identical with *P. Hallii*; but the type specimen in Mr. Colenso's herbarium appears to be *P. Totara*.

3. *P. acutifolius*, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 370, t. 26.—An erect much-branched shrub 3-10 ft. high; branches slender, erect. Leaves usually rather lax, spreading, ⅓-1 in. long, linear, straight, acuminate and pungent, sessile or nearly so, green, coriaceous; midrib indistinct; margins slightly recurved. Flowers diœcious. Males ⅓-½ in. long, solitary or in fascicles of 2-4 at the top of an erect peduncle about ½ in. long, each flower with 4 scarious acuminate bracts at its base, forming a quasi involucre at the top of the peduncle. Anthers numerous, closely packed; connective obtuse. Female flowers minute, axillary, solitary or very rarely geminate at the top of a short swollen peduncle. Fruit small, ovoid, seated on the enlarged and fleshy bright-red peduncle.—*Forest Fl.* t. 39; *Pilger*, *Pflanzenreich*, iv. 5, 84.

SOUTH ISLAND: Marlborough—*Rutland!* Mount Duppa, *Macmahon!* Nelson—Lake Rotoiti and upper part of the Buller Valley, *Kirk!* *T. F. C.*; Hope Valley, *T. F. C.* 1500-3000 ft.

Allied to *P. nivalis*, but at once recognised by the erect slender habit and narrow pungent leaves. From *P. Totara* it is separated by the small size, much more slender habit, and narrower thinner leaves.

4. *P. nivalis*, *Hook. Ic. Plant.* t. 582.—A much-branched erect or prostrate shrub 2-8 ft. high; branches wide-spreading, often rooting at the base. Leaves close-set, sessile, not distichous, spreading or recurved, ¼-⅔ in. long, linear to linear-oblong or narrow linear-obovate, obtuse, apiculate, narrowed to the base, very thick and coriaceous, midrib prominent beneath, margins thickened. Flowers diœcious. Males axillary, solitary or 2-4 at the top of

a slender peduncle, variable in length, very slender, $\frac{1}{4}$ –1 in. long. Anthers very numerous, often laxly placed; connective obtuse. Female flowers solitary, axillary, seated on the top of a short swollen peduncle. Fruit a small oblong-ovoid nut; peduncle much enlarged, fleshy and succulent, bright-red, usually with 2 acute projections at the top (adnate bracts), 1 on each side of the nut.—*Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 232; *Handb. N.Z. Fl.* 257; *Kirk, Forest Fl.* t. 40; *Pilger, Pflanzenreich*, iv. 5, 85. *P. montanus*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 395.

NORTH AND SOUTH ISLANDS: Subalpine localities from the summit of Moechau (Cape Colville) and Hikurangi southwards, not uncommon. 2000–5500 ft.

5. *P. ferrugineus*, *D. Don. in Lamb. Gen. Pinet.* ed. ii. (1832) 189.—A tall forest-tree 50–80 ft. high with a rather narrow round-topped head; trunk 1–3 ft. diam.; bark greyish-brown or almost black, scaling off in large flakes. Leaves distichous, close-set, spreading, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, linear, falcate, acute or subacute, 1-nerved, margins recurved, red-brown when dry; those of young plants longer, narrower, and more acute. Flowers diœcious. Males axillary, solitary, sessile, cylindric, equalling or rather longer than the leaves. Anthers numerous, closely packed; connective obtuse. Female flowers solitary or very rarely geminate at the top of a curved peduncle clothed with minute scale-like bracts. Fruit large, broadly oblong, drupaceous, $\frac{3}{4}$ in. long, reddish-purple with a glaucous bloom, top of the peduncle not enlarged nor succulent.—*A. Cunn. Precur.* n. 327; *Raoul, Choix*, 41; *Hook. Ic. Plant.* t. 542; *Hook. f. Fl. Nov. Zel.* i. 232; *Handb. N.Z. Fl.* 257; *Kirk, Forest Fl.* t. 84; *Pilger, Pflanzenreich*, iv. 5, 66.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in forests throughout. Sea-level to 3000 ft. *Miro*; *Toromiro*; *Black-pine*.

Wood strong, hard and compact, straight-grained, not durable in exposed situations. The fleshy drupes form the chief food of the wood-pigeon during the winter months.

6. *P. spicatus*, *R. Br. in Benn. Pl. Jav. Rar.* 40.—A tall round-headed forest-tree 40–80 ft. high; branches numerous, crowded, erect; trunk 2–4 ft. diam.; bark black or bluish-black, scaling off in large flakes. Young plants with long slender flexuous and pendulous branches, clothed towards the tips with reddish-brown leaves. Leaves of mature plants distichous, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, linear, straight or slightly falcate, obtuse or apiculate, coriaceous, green above, glaucous beneath. Flowers diœcious. Males numerous, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, linear, obtuse, horizontal, arranged in axillary spikes. Anthers closely packed; connective ovate, acute. Female flowers in 3–8-flowered spikes. Fruit black or nearly so, globose, succulent, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam.; fleshy receptacle wanting.—*Hook. Ic. Plant.* t. 543; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 232; *Handb. N.Z. Fl.*

258; Kirk, *Forest Fl.* t. 4, 5; Pilger, *Pflanzenreich*, iv. 5, 65. *P. Matai*, Lamb. ex Hook. f. *Handb. N.Z. Fl.* 741. *Dacrydium taxifolium*, Banks and Soland. ex Lamb. *Pin.* ed. ii. 119. *D. Mai*, A. Cunn. *Precur.* n. 329. *Prumnopitys spicata*, Kent in Veitch *Man. Conif.* ed. ii. 157.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in forests from the North Cape southwards. Sea-level to 2000 ft. *Matai*; *Mai*; *Black-pine*.

A very distinct species, at once recognised by the spicate flowers and globose fruit. Wood brownish, hard, heavy, close-grained, of great strength and durability. This and the preceding differ from the remaining New Zealand species in wanting the succulent receptacle to the fruit.

7. **P. dacrydioides**, A. Rich. *Fl. Nouv. Zel.* 358, t. 39.—A lofty tree 80–100 ft. or 120 ft. high, in swampy localities often growing gregariously and forming dense forests; trunk 2–5 ft. diam. Leaves of two forms: those of young trees distichous, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, linear, falcate, upturned and acuminate at the tip, decurrent at the base, flat, nerveless; of mature trees inserted all round the branch and appressed to it, imbricated, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, subulate-lanceolate, acuminate, keeled. Flowers diœcious. Males solitary, terminal, $\frac{1}{6}$ – $\frac{1}{4}$ in. long; anthers crowded; connective ovate, acute. Female flowers minute, solitary, terminating the branchlets; peduncle and bracts swollen. Fruit a black ovoid nut about $\frac{1}{8}$ in. long, seated on the greatly enlarged bright-red succulent peduncle.—Raoul, *Choix*, 41; Hook. f. *Fl. Nov. Zel.* i. 233; *Handb. N.Z. Fl.* 258; Kirk, *Forest Fl.* t. 31, 32; Pilger, *Pflanzenreich*, iv. 5, 57. *P. thuyoides*, R. Br. in Benn. *Pl. Jav. Rar.* 41. *Dacrydium excelsum*, D. Don. in Lamb. *Pin.* ed. ii. App. *D. ferrugineum*, Van Houtte ex Gord. *Pin.* 590. *D. thuyoides*, Banks and Sol. ex Carr. *Conif.* 479.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In lowland forests from the North Cape southwards, abundant. Sea-level to 2000 ft. *Kahikatea*; *Kahika*; *White-pine*.

One of the tallest trees in the colony, said to occasionally attain the height of 150 ft. The wood is white or pale-yellow, tough and compact, straight-grained, and easily worked, but unfortunately not durable when in contact with the ground or where regularly exposed to damp. It is very suitable for inside work of all kinds, but is liable to the attacks of a small boring beetle.

4. DACRYDIUM, Soland.

Trees or shrubs. Leaves usually dimorphic; of old trees small and scale-like, closely imbricate; of young trees or of the lower branches of old ones longer and narrower, spreading, linear or linear-subulate. Flowers diœcious or more rarely monœcious. Males solitary at the tips of the branchlets and sessile amongst the uppermost leaves. Staminal column oblong or cylindrical; anthers sessile, spirally imbricate; cells 2, globose, contiguous, deflexed; connective prolonged into a terminal claw or spur. Female flowers at or

near the tips of the branchlets, the bracts hardly differing from the foliage leaves. Ovuliferous scale free, at length exceeding the bract; ovule solitary, at first more or less reversed, at length erect. Seeds ovoid, nut-like, seated within a membranous or fleshy cup-shaped aril. Cotyledons 2.

About 16 species are known, natives of the Malay Peninsula, Borneo, Australia and Tasmania, New Caledonia, New Zealand, and Chili. All the species found in New Zealand are endemic.

A. Leaves of young plants spreading, linear, flat, abruptly passing into the smaller mature scale-like leaves. Nuts 1-5 together.

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|--|--------------------------|
| Height 50-80 ft. Leaves of young trees 1-1½ in., shortly petiolate. Mature branchlets nearly terete. Nuts 1-5, usually 3-4 | 1. <i>D. Kirkii</i> . |
| Height 15-30 ft. Leaves of young trees ½-¾ in., shortly petiolate. Mature branchlets tetragonous, stout. Nuts 1-2 | 2. <i>D. biforme</i> . |
| Height 2-10 ft. Leaves of young trees ¼-½ in., sessile. Mature branchlets tetragonous. Nuts 1-2 | 3. <i>D. Bidwillii</i> . |

B. Leaves of very young plants spreading, linear, terete, passing by gradual transitions into the mature scale-like imbricating leaves. Nuts usually solitary.

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|---|----------------------------|
| Height 60-100 ft.; branchlets pendulous. Leaves of mature plants ⅜-½ in., subulate, trigonous. Receptacle below the female flower often fleshy | 4. <i>D. cupressinum</i> . |
| Height 20-40 ft.; branchlets not pendulous. Leaves of young trees (second stage) trigonous, not distichous. Mature branchlets ⅜ in. diam.; leaves ⅜-1 in. long, obtuse. Nuts solitary; aril short | 5. <i>D. intermedium</i> . |
| Height 20-50 ft., branchlets not pendulous. Leaves of young trees (second stage) flat, triangular, decurrent, often distichous. Mature branchlets ⅜-1 in. diam.; leaves ⅜-1½ in. long, subacute. Nuts often 2; aril large, sometimes reaching the middle of the nut | 6. <i>D. Colensoi</i> . |
| Prostrate, 3-18 in. long; branches straggling. Leaves of mature plants either spreading, ⅜-1 in. long, or imbricating, ⅜-1 in. | 7. <i>D. laxifolium</i> . |

1. *D. Kirkii*, *F. Muell. ex Parl. in D.C. Prodr.* xvi. ii. 495.—A tall tree 50-80 ft. high; trunk 2-3 ft. diam.; bark greyish-brown; lower branches spreading, upper more erect. Leaves of two forms; those of young trees and on the lower branches of old ones large, erecto-patent, 1-1½ in. long, linear, subacute, narrowed into a very short twisted petiole, flat, pale-green, coriaceous; midrib distinct; margins slightly cartilaginous. Leaves of the upper and fertile branches small and scale-like, densely quadrifariously imbricate and appressed to the almost terete branchlets, ⅜-1 in. long, ovate-rhomboid, obtuse, thick and coriaceous, obtusely keeled on the back; margins thin, membranous. Flowers diœcious. Males solitary, terminal, sessile, ⅜-1 in. long. Females at the tips of the branchlets, forming a short oblong head ¼-½ in. long. Nuts 1-5.

(usually 3-4), oblong, obtuse, compressed, striate, about $\frac{1}{8}$ in. long. — *Kirk in Trans. N.Z. Inst.* x. (1878) 390, t. 19; *Forest Fl.* t. 97; *Hook. f. Ic. Plant.* t. 1219; *Pilger in Pflanzenreich*, iv. 5, 46.

NORTH ISLAND: In forests from Hokianga to the Manukau Harbour, rare and local. Whangaroa, *Hector* and *Buchanan!* between Hokianga and the Northern Wairoa, *Petrie!* between the Bay of Islands and Whangarei, *R. Mair!* *T. F. C.*; Great Barrier Island, *Kirk!* Titirangi (near Auckland), *T. F. C.* Sea-level to 2000 ft. *Monoao.*

A handsome tree, distinguished from its immediate allies by the large size, the large leaves of the young trees and lower branches of the old ones, the almost terete fertile branchlets, and the usually numerous nuts. The transition from the long linear leaves of the young state to the small scale-like leaves of the old plant is most abrupt. Both forms can often be found on the same branch. The wood is pale brownish-red, strong and compact, and exceedingly durable.

2. *D. biforme*, *Pilger in Pflanzenreich*, iv. 5, 45.—A small tree 15-30 ft. or 40 ft. high, in alpine localities often dwarfed to a few feet; trunk short, 1-2 ft. diam.; bark dark-brown; branches stout, clothed with the persistent and indurated leaves; mature branchlets tetragonous. Leaves of two forms; those of young plants and on the lower branches of old ones spreading, $\frac{1}{3}$ - $\frac{3}{4}$ in. long, $\frac{1}{15}$ - $\frac{1}{12}$ in. broad, linear, acute, narrowed into a very short broad often twisted petiole, flat, coriaceous; midrib distinct. Leaves of old or fertile branchlets small and scale-like, densely quadrifariously imbricate and closely appressed, $\frac{1}{20}$ - $\frac{1}{12}$ in. long, triangular or rhomboid-triangular, obtuse, very thick and coriaceous, stoutly and prominently keeled on the back. Flowers diœcious. Males solitary, terminal, sessile, about $\frac{1}{8}$ in. long; anthers 4-6; connective ovate, obtuse. Female flowers near the tips of the branchlets. Nuts 1-2 (usually solitary), oblong, obtuse, striate, compressed, about $\frac{1}{10}$ in. long.—*D. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 234, and *Handb. N.Z. Fl.* 259 (not of *Hook. Ic. Plant.* t. 548); *Kirk in Trans. N.Z. Inst.* x. (1878) 390; *Forest Fl.* t. 96. *Podocarpus(?) biformis*, *Hook. Ic. Plant.* t. 544.

NORTH ISLAND: Mountain districts from Tongariro and the Ruahine Mountains southwards, not common. SOUTH ISLAND, STEWART ISLAND: Not uncommon in mountain forests throughout. Usually from 2000 to 4500 ft., but descends to sea-level in the south-west of Otago and on Stewart Island. *Yellow-pine*; *Tar-wood*.

This is for the most part the *D. Colensoi* of the Flora and the Hand-book; but, as shown elsewhere, not the plant originally described under that name by Sir W. J. Hooker.

3. *D. Bidwillii*, *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* x. (1878) 388.—A closely branched erect or prostrate shrub 2-10 ft. high; lower branches spreading, sometimes reclinate and rooting; upper more erect, frequently giving a pyramidal form to the plant; trunk short, 3-9 in. diam. Leaves of two forms; those of young plants and on the lower branches of old ones spreading, crowded,

$\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear, obtuse, sessile by a comparatively broad base, flat, coriaceous; midrib usually distinct. Leaves on the upper and fertile branches small and scale-like, densely quadrifariously appressed, $\frac{1}{25}$ – $\frac{1}{12}$ in. long, triangular, obtuse, very thick and coriaceous. Flowers dioecious. Males solitary, terminal, sessile, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Female flowers near the tips of the branchlets. Nuts 1 or 2, small, striate, compressed, obtuse, about $\frac{1}{12}$ in. long.—*Forest Fl.* t. 37; *Pilger in Pflanzenreich*, iv. 5, 46.

Var. *a*, **erecta**, *Kirk*.—Main branches ascending or erect, giving the plant a pyramidal or almost fastigiate outline.

Var. *b*, **reclinata**, *Kirk*.—Main branches prostrate or horizontal.

NORTH ISLAND: Summit of Moehau (Cape Colville), *Adams*! Ruahine Mountains, *Colenso*! Lake Rotoaira, *Tryon*! Ruapehu, *Rev. F. H. Spencer*! SOUTH ISLAND, STEWART ISLAND: Not uncommon in subalpine localities throughout. Usually from 2000–4500 ft., but descending to sea-level in Stewart Island.

A near ally of *D. biforme*, principally differing in the smaller size and remarkably distinct habit, in the smaller linear leaves, which are sessile by a broad base, and in the more slender branchlets and smaller nut. When seen growing it is distinguished without any difficulty, but dried specimens not showing the linear leaves are easily confounded with slender states of *D. biforme*.

4. **D. cupressinum**, *Soland. ex Forst. Pl. Escul.* 80.—A tall forest-tree 60–80 ft. or even 100 ft. high, with a comparatively small round-topped head when mature, but pyramidal when young, with very long pale-green pendulous branches; trunk 2–5 ft. diam.; bark dark-brown, scaling off in large flakes. Leaves imbricating all round the branch; of young trees lax, ascending, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear-subulate, acute, almost acrosc, decurrent at the base; gradually passing into those of the mature trees, which are much smaller and more closely set and more appressed to the branch, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, linear, acute, trigonous, keeled at the back. Flowers dioecious. Males solitary or rarely 2 together at the tips of the branchlets, oblong; connective broadly ovate, acuminate. Female flowers solitary on the curved tips of the branchlets. Nut ovoid, barely compressed, about $\frac{1}{8}$ in. long, seated within a cup-shaped aril; receptacle and bracts sometimes enlarged, fleshy and coloured, at other times remaining dry and unaltered.—*A. Rich. Fl. Nouv. Zel.* 361; *A. Cunn. Precur.* n. 332; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 233; *Handb. N.Z. Fl.* 258; *Kirk, Forest Fl.* t. 18–22; *Pilger in Pflanzenreich*, iv. 5, 53. *Thalamia cupressina*, *Spreng. Syst.* iii. 890.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in forests throughout. Sea-level to 2500 ft. *Rimu*; *Red-pine*.

A well-known tree, the young state of which, with its graceful shape and pale-green pendent branches, is perhaps as beautiful and attractive as any tree

in New Zealand. The wood is deep-red, strong, hard, and heavy, but often twisted in the grain. It is largely used for building purposes of all kinds and for the manufacture of furniture, but is not nearly as durable as either kauri or totara.

5. *D. intermedium*, *T. Kirk in Trans. N.Z. Inst.* x. (1878) 386, t. 20.—A small tree 20–40 ft. high or more; branches spreading; trunk 1–2 ft. diam., rarely more; bark brownish-grey. Leaves of very young plants lax, spreading, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, narrow linear-subulate, acute, curved, terete; gradually passing into the leaves of young trees, which are closer-set, squarrose or erecto-patent, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, broadly subulate, trigonous, acute. These again pass by imperceptible transitions into those of mature trees, which are densely quadrifariously imbricate and appressed to the branch, $\frac{1}{15}$ – $\frac{1}{10}$ in. long, ovate-triangular or rhomboid, obtuse, keeled, very thick and coriaceous. Flowers diœcious or rarely monœcious. Males usually abundantly produced, solitary, terminal, sessile, about $\frac{1}{4}$ in. long; anthers numerous; connective broadly triangular, acute. Female flowers solitary at the tips of the branchlets. Nut oblong, obtuse or apiculate, faintly striate, not compressed, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, enclosed at the base in a short cup-shaped aril.—*Forest Fl.* t. 86; *Pilger in Pflanzenreich*, iv. 5, 51.

NORTH ISLAND: Between the Bay of Islands and Whangarei, *R. Mair!* Great Barrier Island, *Kirk!* from Cape Colville to the Thames goldfields and Te Aroha, *Kirk!* Adams! *T. F. C.*; from Lake Taupo to the Ruahine Mountains and the Tararua Range, *Colenso!* Tryon! *Mair!* A. Hamilton! SOUTH ISLAND, STEWART ISLAND: Not uncommon in mountain forests, chiefly on the western side of the island. Sea-level to 4000 ft. *Mountain-pine*; *Yellow Silver-pine*.

Wood reddish-yellow, highly resinous and very inflammable, of great strength and durability; largely used in Westland (together with *D. Colensoi*) for railway-sleepers, telegraph-poles, &c.

6. *D. Colensoi*, *Hook. Ic. Plant.* t. 548 (not of *Hook. f.*).—A small tree 20–40 ft. high or more, very similar in mode of growth to *D. intermedium*, but rather taller and more conical, with a straighter and cleaner trunk; branchlets more slender, often flexuous, $\frac{1}{20}$ – $\frac{1}{15}$ in. diam. Leaves of very young plants lax, spreading, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, narrow linear-subulate, terete, decurrent at the base; gradually passing into the leaves of young trees, which are more closely set, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, lanceolate or narrow-triangular, acute, falcate, flat, decurrent at the base, often more or less spreading in one plane, giving the branchlets a distichous appearance. These pass by insensible gradations into those of mature trees, which are small and scale-like, densely quadrifariously imbricate and appressed to the branch, $\frac{1}{20}$ – $\frac{1}{12}$ in. long, rhomboid, obtuse or sub-acute, thick and coriaceous, keeled, apex often incurved. Flowers diœcious. Males solitary, terminal, sessile, $\frac{1}{8}$ – $\frac{1}{6}$ in. long; anthers numerous; connective broad, triangular, acute. Female flowers at the tips of the branchlets. Nuts 1 or 2, oblong, obtuse, not com-

pressed, about $\frac{1}{12}$ in. long, enclosed for $\frac{1}{3}$ of their length or more in a lax cup-shaped aril. — *Pilger in Pflanzenreich*, iv. 5, 51. *D. Westlandicum*, *T. Kirk in Trans. N.Z. Inst.* x. (1878) 387, t. 18; *Forest Fl.* t. 85; *Hook. f. Ic. Plant.* t. 1218.

NORTH ISLAND: Between Mongonui and Kaitaia, *Carse!* Whangaroa, *Hector!* between the Bay of Islands and Whangarei, *Colenso!* Great Barrier Island, *Kirk!* Waimarino Forest, *Kirk!* SOUTH ISLAND: Not uncommon along the West Coast from Collingwood to Martin's Bay, *Kirk!* *Spencer!* *Townson!* *Brame!* *Helms!* &c. Sea-level to 3000 ft. *Silver-pine!* *Monoao.*

Very close to the preceding; but the leaves of the young trees are much flatter, more decurrent, and often distichous; the mature leaves are smaller and the branchlets more slender; and the nuts are smaller, often 2 together, and are enclosed sometimes almost as far as the middle in the unusually well-developed aril. The wood is yellowish-white, straight-grained, strong and compact, very durable. It is exported from Westland to all parts of the colony for railway-sleepers, and has been used with good results for the framework of bridges, wharves, &c.

D. Colensoi is a species which has been much misunderstood. By nearly all writers the name has been applied to the mountain-plant originally described by Sir W. J. Hooker in the "Icones Plantarum" (t. 544) as *Podocarpus(?) biformis*, the *Dacrydium biforme* of this work, although the two species are in reality totally different. The mistake appears to have originated in the "Flora Novæ Zealandiæ," where Sir J. D. Hooker quoted *Podocarpus(?) biformis* as a synonym of *D. Colensoi*. His description is based entirely on *D. biforme*, and the localities given (Dusky Bay, *Menzies!* Tongariro and Ruahine Mountains, *Colenso!* mountains near Nelson, *Bidwill!*) all unquestionably refer to the same plant. It is curious that, although the original plate of *D. Colensoi* is cited in the Flora, no reference is given to the locality in which the species was first discovered. From a letter of Mr. Colenso's sent with the type specimens, and published in the *London Journal of Botany* (Vol. i. p. 301), this appears to have been the rough forest country between Whangarei and the Bay of Islands—a station quite 250 miles to the north of the northern limit of *D. biforme*. Early in the preparation of this work a comparison of the original descriptions and figures convinced me that, although the plate of *Podocarpus(?) biformis* was a very faithful representation of the plant to which all New Zealand botanists, following the example of Sir J. D. Hooker, at that time assigned the name of *Colensoi*, it by no means corresponded with the original plate of *D. Colensoi*. Not only did the two plants differ in a marked degree in habit and foliage, but the figures given of the fruit of *D. Colensoi* were so unlike that of *D. biforme* as to make their specific distinctness beyond all doubt. It therefore became necessary to restore *Podocarpus(?) biformis* to the rank of a species under the name of *D. biforme*. Further study of the original plate of *D. Colensoi* made it clear that two subsequently described species—*D. intermedium* and *D. Westlandicum*—were evidently close allies, *intermedium* so far as the foliage was concerned, *Westlandicum* with respect to the fruit. Under these circumstances I applied to Kew with the object of having these two plants compared with the type specimens, but, unfortunately, it was found that the latter were no longer in the herbarium. About this time Dr. Pilger, of Berlin, took up the study of the *Taxaceæ* for "Das Pflanzenreich." Fortunately he found one of Colenso's original specimens in the Imperial Herbarium at Vienna. He has thus been able to compare it with the other New Zealand species, and has satisfied himself that it is identical with *D. Westlandicum*. I willingly accept this determination, although *D. Westlandicum* usually has much more slender branches than those figured in the original plate. I am also glad to take this opportunity of referring New Zealand students to Dr. Pilger's memoir, which contains carefully prepared descriptions of the whole of the New Zealand Taxads, and much valuable information respecting them.

7. *D. laxifolium*, Hook. f. in Hook. Lond. Journ. Bot. iv. (1845) 143.—A small prostrate shrub with very slender trailing branches 3–24 in. long; rarely suberect, and reaching a height of 2 ft. Leaves of young plants lax, spreading, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, narrow-linear, acute, flat, curved; with the growth of the plant gradually becoming shorter, broader and thicker, and more closely set. Leaves of mature plants varying from $\frac{1}{8}$ in. long, linear-oblong, obtuse or subacute, spreading, to $\frac{1}{25}$ – $\frac{1}{10}$ in. long, broadly ovate or oblong, obtuse, keeled or rounded on the back, closely imbricate. Flowers diœcious or monœcious. Males solitary, terminal, sessile, $\frac{1}{5}$ – $\frac{1}{4}$ in. long. Female flowers solitary and terminal. Nut small, erect, oblong, obtuse with a small curved apiculus, about $\frac{1}{8}$ in. long; receptacle sometimes dry, sometimes swollen and succulent.— *Ic. Plant. t. 825; Fl. Nov. Zel. i. 234; Handb. N.Z. Fl. 259; Kirk in Trans. N.Z. Inst. x. (1878) 388; Forest Fl. t. 87; Pilger in Pflanzenreich, iv. 5, 50.*

NORTH ISLAND: Tongariro, Bidwill, Hector! T. F. C.; Ruapehu, Rev. F. H. Spencer! Ruahine Mountains, Colenso! H. Hill! Hamilton! SOUTH ISLAND, STEWART ISLAND: Common in mountain districts throughout. Usually between 2500 ft. and 4000 ft., but descends to sea-level in Stewart Island.

A very remarkable little species, probably the smallest known pine. Fruiting specimens can often be seen barely 3 in. in diameter, although the usual size of the plant is more. The minute imbricated leaves are often entirely wanting, even in old plants; at other times both imbricated and spreading leaves occur on the same branch.

5. PHYLLOCLADUS, L. C. Rich.

Trees or shrubs; branches often whorled; branchlets flattened and expanded into rigid and coriaceous toothed or lobed leaf-like cladodia. True leaves reduced to linear scales. Flowers monœcious or diœcious. Males fascicled at the tips of the branchlets, catkin-like, peduncled; each peduncle arising from the axil of a leafy bract. Staminal column oblong or cylindrical; anthers numerous, densely spirally imbricate, 2-celled; connective prolonged into an acute claw. Female flowers sessile on the margins of the cladodia or on peduncle-like divisions of the cladodia. Ovuliferous scales 1 or several, thick and fleshy, free. Ovule solitary, erect. Seeds erect, ovoid or oblong, compressed, protruding from the enlarged and fleshy scales, each seated within a cup-shaped aril. Cotyledons 2.

Besides the 3 species found in New Zealand, there is one in Tasmania, another in Borneo, and a sixth in New Guinea and the Philippine Islands. The genus is remarkable for the flattened cladodes or leaf-like branchlets, which take the place of the true leaves, these last being reduced to linear deciduous scales. The New Zealand species have been excellently described and figured by Mr. Kirk in Vol. x. of the "Transactions of the New Zealand Institute" and in his "Forest Flora."

* *Cladodes* pinnately arranged.

Tree 50–70 ft. *Cladodes* $\frac{1}{2}$ –1 in. Female flowers on the margins of the *cladodes* 1. *P. trichomanoides*.

Tree 25–40 ft. *Cladodes* 1–2 $\frac{1}{2}$ in. Female flowers peduncled on the rhachis below the *cladodes* 2. *P. glaucus*.

** *Cladodes* simple.

Shrub or tree 5–25 ft. *Cladodes* $\frac{1}{2}$ –1 in. Female flowers on the margins of the *cladodes* near the base 3. *P. alpinus*.

1. *P. trichomanoides*, *D. Don. in Lamb. Pin. ed. ii. App.*—A tall graceful tree 50–70 ft. high; trunk 1–3 ft. diam.; branches whorled, slender, spreading. *Cladodes* or flattened leaf-like branchlets alternate and distichous on whorled rhachises 1–3 in. long, each rhachis and its *cladodes* resembling a pinnate leaf; each *cladode* $\frac{1}{2}$ –1 in. long, obliquely cuneate or rhomboid, thick and coriaceous, lobed or pinnatifid, the lobes truncate or erose; veins spreading. Leaves of seedling plants $\frac{1}{2}$ – $\frac{3}{4}$ in. long, narrow-linear, soon deciduous; of older plants reduced to minute subulate scales at the base of the rhachises of the *cladodes* or of the *cladodes* themselves. Flowers monœcious. Males in fascicles of 5–10 at the tips of the branchlets, $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Females on the margins of modified *cladodes* at the tips of the branchlets, *cladodes* much reduced in size, often little more than a peduncle, each flower in the axil of a minute subulate bract. Nuts solitary, compressed, half exerted beyond the thickened and fleshy scales; aril cupular, with an irregularly crenulate margin.—*A. Cunn. Precur. n.* 326; *Raoul, Choix*, 41; *Hook. Ic. Plant. t.* 549, 550, 551; *Hook. f. Fl. Nov. Zel. i.* 235; *Handb. N.Z. Fl.* 259; *Kirk in Trans. N.Z. Inst. x.* (1878) 381; *Forest Fl. t.* 6, 7; *Pilger in Pflanzenreich*, iv. 5, 97. *P. rhomboidalis*, *A. Rich. Fl. Nowv. Zel.* 363 (not of *L. C. Rich.*).

NORTH ISLAND: In forests from the North Cape to Taranaki and Hawke's Bay, not uncommon. SOUTH ISLAND: Northern portions of Nelson and Marlborough, advancing along the West Coast as far south as Westport. Sea-level to 2500 ft. *Tanekaha*; *Toatoa*; *Celery-leaved Pine*.

Wood white, close-grained, free from knots and other defects, very serviceable for sleepers, piles, the timbers of bridges, and probably for general building purposes. Bark often used for tanning, and by the Maoris for the preparation of a red dye.

2. *P. glaucus*, *Carr. Trait. Gen. Conif.* 502.—A small handsome tapering tree 25–40 ft. high; branches stout, whorled; trunk 12–18 in. diam., rarely more. *Cladodes* or flattened leaf-like branchlets alternate and distichous on a rhachis 4–12 in. long, glaucous when young, 1–2 $\frac{1}{2}$ in. long, rhomboid or obliquely ovate-cuneate, extremely coriaceous, deeply or coarsely toothed or lobed, lobes obtuse or acute. True leaves on seedling plants $\frac{1}{2}$ –1 in. long, linear,

obtuse, membranous; on mature plants chiefly developed at the base of the young rhachises and falling away very early. Flowers diœcious or monœcious. Males very numerous, in fascicles of 10–20 at the tips of the branches, $\frac{3}{4}$ –1 in. long, on stout peduncles of equal length. Female flowers forming globose heads terminating short stout distichous peduncles (modified cladodes) springing from the rhachis below the cladodes; fully ripe heads $\frac{1}{2}$ in. long. Nuts 8–20, compressed, about $\frac{1}{8}$ in. long, half exserted beyond the thickened scales; aril cupular. — *Kirk in Trans. N.Z. Inst.* i. (1868) 149; x. (1878) 380; *Forest Fl.* t. 98, 99; *Pilger in Pflanzenreich*, iv. 5, 95.

NORTH ISLAND: Between Whangape and Hokianga, *Kirk!* between Hokianga and the Northern Wairoa, *Petrie!* Puhipuhi Forest, *R. Mair!* Great Barrier Island, Omaha, *Kirk!* Waitakerei Ranges, *T. F. C.*; from Cape Colville to the Thames goldfields and Te Aroha, *Kirk!* Adams! *T. F. C.* Wairoa South, *Kirk!* near Titiraupenga, *T. F. C.* Sea-level to 2000 ft. *Toatoa.*

A very distinct species, quite the most handsome of the New Zealand Taxads, and easily recognised by the robust branches, very large cladodes, and large female flowers. Carrière's description, founded on garden specimens of doubtful origin cultivated in France, hardly agrees with wild specimens, but probably refers to the same species.

3. *P. alpinus*, *Hook. f. Fl. Nov. Zel.* i. 235, t. 53.—A shrub or small tree, usually from 8 ft. to 25 ft. high, but in exposed alpine localities often reduced to a bush of 3–6 ft.; branches numerous, short, stout, spreading; trunk short, 6–14 in. diam. Cladodes simple, crowded, spreading, $\frac{1}{2}$ –1½ in. long, variable in shape, linear-oblong to oblong-rhomboid, obtuse or acute, very coriaceous, glaucous, lobed or pinnatifid, lobes usually obtuse. True leaves on seedling plants linear, $\frac{1}{4}$ –½ in. long. Flowers monœcious. Males in fascicles of 2–5 at the tips of the branchlets, $\frac{1}{4}$ –½ in. long; peduncles short, sometimes almost wanting. Females forming globose heads towards the base of the cladodes or on the margins of modified ones. Fully ripe heads about $\frac{1}{4}$ in. diam.; scales fleshy, bright-red. Nuts small, compressed, exserted beyond the scales; aril cupular, margin irregularly lobulate.—*Handb. N.Z. Fl.* 260; *Kirk in Trans. N.Z. Inst.* x. (1878) 382; *Forest Fl.* t. 100; *Pilger in Pflanzenreich*, iv. 5, 98. *P. trichomanoides* var. *alpinus*, *Parl. in D.C. Prodr.* xvi. 2, 498.

NORTH AND SOUTH ISLANDS: In subalpine and mountain forests from Cape Colville and Te Aroha to Foveaux Strait, abundant. Usually from 1500 ft. to 5000 ft., but descends to sea-level in Westland and in the south of Otago. *Mountain Toatoa.*

Very closely allied to the Tasmanian *P. rhomboidalis*, L. C. Rich. (*P. aspleniifolius*, Hook. f.), principally differing in the position of the female flowers. It is a very important constituent of the subalpine forests of the South Island, particularly at high altitudes.

ORDER LXXIX. ORCHIDEÆ.

Herbs, either terrestrial and tuberous-rooted, with annual herbaceous stems; or epiphytes with creeping rhizomes emitting fibrous or fleshy roots and bearing simple or branched leafy stems often thickened into pseudobulbs. Flowers hermaphrodite, solitary or in spikes or racemes or panicles, often large and showy. Perianth superior, irregular, of 6 free or more or less combined segments, in 2 series; the 3 outer (sepals) all similar or the dorsal one larger and more concave than the 2 lateral which are always alike; the 3 inner (petals) always dissimilar (except in *Thelymitra*), the 2 lateral alike, but the third (called the lip, or *labellum*) usually exceedingly different, often spurred, lobed, fringed, or furnished with glands or other appendages. Stamens and style confluent into a fleshy variously shaped central body facing the lip, called the column; anther usually solitary (2 in *Cypripedium*), placed on the front, top, or back of the column, and either free or adnate to it, persistent or deciduous, usually 2-celled; pollen granular or waxy, usually cohering in each cell into 1, 2, or 4 pairs of pollen-masses (*pollinia*), which are either free or attached, directly or by a caudicle, to a gland on the apex of the stigma (*rostellum*). Ovary inferior, 1-celled; ovules numerous, on 3 parietal placentas; stigma a viscid depression towards the top or on the front of the column, below the anther, facing the lip, upper margin often produced into a beak or point called the rostellum. Fruit a 1-celled 3-valved capsule; seeds numerous, very minute; testa loose, reticulate; albumen wanting; embryo solid, fleshy.

A very extensive and distinct family, found in almost all parts of the world, but rare or absent in extreme northern or southern latitudes, and on the tops of high alpine mountains. Most of the species found in temperate countries are terrestrial; but in the tropics the greater number are epiphytes, growing upon the branches or trunks of trees or on rocks. The genera are estimated at 340, the species at 5000. Notwithstanding the great extent of the order, it is singularly deficient in useful plants. The only one possessing any commercial importance is vanilla, the scented pods of which are used for flavouring delicate dishes or liqueurs. The great beauty and singularity of the flowers of many of the tropical species have caused them to be extensively cultivated in hothouses, and probably over 2000 distinct species are now grown by European horticulturists.

The close affinity existing between the flora of New Zealand and that of Australia is nowhere better shown than in the *Orchideæ*. Out of 21 genera found in New Zealand, 19 occur in Australia as well, and 8 are absolutely confined to the two countries, while several others have a very limited additional range. The only genera with a wide distribution are *Dendrobium*, *Bulbophyllum*, and *Spiranthes*. *Earina*, which does not occur in Australia, is found in the Pacific islands, while *Townsonia* is endemic.

A. Epiphytes with creeping rhizomes, perennial stems, and evergreen leaves.
Pollinia waxy, free or attached by caudicles to the rostellum.

* *Pollinia* free.

The New Zealand species with slender much-branched stems, no pseudobulbs and axillary flowers. Lateral sepals and lip adnate to the base of the column

.. 1. DENDROBIUM.

The New Zealand species forming small matted patches on the trunks of trees, furnished with pseudobulbs. Flowers on a scape rising from the base of the pseudobulb. Lip jointed on to the base of the column, mobile. Stems leafy, unbranched. Flowers in terminal panicles. Lateral sepals free. Lip 3-lobed

2. BULBOPHYLLUM.
3. EARINA.

** Pollinia attached to the rostellum by a caudicle.

Stems short, leaves few. Flowers small, in lateral racemes. Lip 3-lobed

4. SARCOCHILUS.

B. Terrestrial, with tuberous roots and annual stems. Pollinia granular or powdery.

* Leaves long, very narrow-linear, flat or terete.

a. Leaves more than one.

Flowers numerous, on a spirally twisted spike. Dorsal sepal and petals connivent into a hood. Lip undivided. Flowers several, spicate. Dorsal sepal broad, hooded; lateral linear or filiform, erect. Lip 3-lobed

5. SPIRANTHES.
7. ORTHOCERAS.

b. Leaf solitary.

Sepals, petals, and lip all similar in shape, petaloid. Column very short, not attached to the lip at the base

6. THELYMITRA.

Dorsal sepal concave. Petals much smaller. Surface of lip covered with long hairs. Column very short

14. CALOCHILUS.

Dorsal sepal concave. Lip uppermost, undivided, usually with an adnate gland on the disc. Column very short, with two lateral erect appendages

9. PRASOPHYLLUM.

Dorsal sepal concave. Lip below, entire or 2-lobed. Column very short

8. MICROTIS.

Sepals and petals all linear. Lip uppermost, articulate, clawed; lamina peltate, irritable and mobile. Column long, winged

10. CALEANA.

Sepals and petals narrow. Lip entire or 3-lobed, not jointed or irritable, disc with glandular processes, margin often fringed. Column long, winged above

16. CALADENIA.

** Leaves shorter, two or several, oblong or lanceolate or linear.

Leaves numerous; radical broad, sometimes wanting; cauline narrow. Flowers hood-shaped, green. Lateral sepals united at the base. Lip narrow, irritable, with a basal appendage

11. PTEROSTYLIS.

Leaves 2-3, lanceolate. Upper sepal broad, concave; lateral narrow. Lip broad, papillose or ridged. Column not winged

15. LYPERANTHUS.

Leaves 2, radical, oblong. Upper sepal broad, concave; lateral narrow-linear. Lip broad, with raised glands on the disc. Column winged, wings produced into 2 erect lobes at the top

17. CHILOGLOTTIS.

*** Leaf solitary, broad.

Flower solitary, large, purple. Upper sepal broad, concave; lateral and petals long and filiform or minute. Lip large, broad, involute. Column very short

20. CORYSANTHES.

- Flower solitary. Upper sepal narrow, concave; lateral and petals lanceolate. Lip 3-lobed; disc with raised glands. Column long, winged above; wing produced upwards into 2 toothed lobes 18. *ADENOCILUS*.
- Flowers 1 or 2. Upper sepal broad, concave; lateral lanceolate. Petals minute. Lip broad, undivided; disc smooth. Column long, equally winged, wings not produced upwards 19. *TOWNSONIA*.
- Flowers several. Sepals and petals narrow, acuminate. Lip spreading, broad, concave. Column long 12. *ACIANTHUS*.
- Flowers 2-3. Sepals and petals linear, obtuse. Lip spreading, narrow, flat. Column long, winged above.. 13. *CYRTOSTYLIS*.

*** Leafless. Stem tall, with brown sheathing scales.

- Sepals and petals united into a 5-lobed ventricose tube .. 21. *GASTRODIA*.

The above clavis is purely artificial, and is solely intended to facilitate the determination of the genera. The following arrangement, which is adapted from Hooker and Bentham's "Genera Plantarum" and Engler's "Pflanzenfamilien," is more natural and shows the sequence adopted in this work:—

Tribe I. *EPIDENDREÆ*.—Anther lid-like, usually deciduous; cells parallel, distinct. Pollinia waxy, 1-4 in each cell, free, or those of each cell connected by a viscid appendage, not attached by their bases or by a caudicle to the rostellum.

1. *DENDROBIUM*. 2. *BULBOPHYLLUM*. 3. *EARINA*.

Tribe II. *VANDEÆ*.—Anther lid-like, usually deciduous, resting on the rostellum; cells usually confluent. Pollinia waxy, usually 2 or 4 in superposed pairs, attached singly or in pairs to a gland or process of the rostellum, which comes away with them when they are removed.

4. *SARCOCHILUS*.

Tribe III. *NEOTTIEÆ*.—Anther lid-like or erect and persistent; cells distinct, parallel. Pollinia granular or powdery.

Subtribe 1. *Spirantheæ*.

5. *SPIRANTHES*.

Subtribe 2. *Thelymitreæ*.

6. *THELYMITRA*.

Subtribe 3. *Diurideæ*.

7. *ORTHOCERAS*. 8. *MICROTIS*. 9. *PRASOPHYLLUM*.

Subtribe 4. *Pterostylideæ*.

10. *CALEANA*. 11. *PTEROSTYLIS*.

Subtribe 5. *Caladeniæ*.

12. *ACIANTHUS*. 13. *CYRTOSTYLIS*. 14. *CALOCILUS*. 15. *LYPERANTHUS*. 16. *CALADENIA*. 17. *CHIOGLOTTIS*. 18. *ADENOCILUS*. 19. *TOWNSONIA*.

Subtribe 6. *Pogoniæ*.

20. *CORYSANTHES*.

Subtribe 7. *Gastrodieæ*.

21. *GASTRODIA*.

1. **DENDROBIUM**, Swartz.

Epiphytes. Stems long and branching, or short and simple and thick, sometimes reduced to pseudobulbs. Leaves coriaceous or fleshy, never plaited. Flowers often large and handsome, rarely small. Sepals nearly equal, the lateral ones dilated at the base, and obliquely adnate to the foot of the column, forming a short spur or pouch. Petals about as long as the upper sepal. Lip contracted at the base and adnate to the produced foot of the column, rarely clawed, usually 3-lobed; lateral lobes embracing the column or spreading; middle lobe broad or narrow, spreading or recurved; disc often lamellate. Column short, produced at the base, winged or angled or toothed at the top. Anther terminal, lid-like, 2-celled; pollinia 4, free, compressed, in collateral pairs in each cell.

A large genus of about 300 species, most abundant in the Malay Archipelago, but extending as far north as Japan, and southwards through Australia and Polynesia to New Zealand. The single species found in New Zealand is endemic, but is closely allied to the Polynesian *D. biflorum*, Swartz.

1. **D. Cunninghamii**, *Lindl. Bot. Reg.* sub. t. 1756.—Stems usually much branched, slender, rigid, wiry, terete, polished, 1–4 ft. long; usually pendulous, but small specimens growing on rocks or in exposed places are often erect. Leaves numerous, distichous, alternate, $\frac{3}{4}$ –2 in. long, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad, linear-lanceolate, acute, rigid and coriaceous, striate and more or less conspicuously 3-nerved; sheaths truncate, grooved and transversely corrugated. Peduncles shorter or longer than the leaves, usually 1–3-flowered, rarely 3–6-flowered; pedicels slender; bracts short. Flowers $\frac{3}{4}$ in. diam., white and pink. Upper sepal oblong-lanceolate, acute; lateral rather larger, broader at the base. Petals about equalling the sepals, oblong, obtuse. Lip attached by a short claw to the foot of the column, 3-lobed; lateral lobes small, ascending; middle lobe spreading, large, almost as broad as long; margins undulate; disc with 4 or 5 thin lamellæ. Capsule oblong, $\frac{1}{3}$ in. long.—*A. Cunn. Precur.* n. 316; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 240; *Handb. N.Z. Fl.* 262. *D. biflorum*, *A. Rich. Fl. Nouv. Zel.* 167, t. 26 (not of Swartz). *D. Lessonii*, *Col. in Trans. N.Z. Inst.* xv. (1883) 326.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Lowland districts from the North Cape southwards. Sea-level to 2000 ft. December–February.

For some notes on the fertilisation, see a paper by Mr. G. M. Thomson in *Trans. N.Z. Inst.* xi. 419. I cannot separate Mr. Colenso's *D. Lessonii* from the ordinary state of the plant, even as a variety.

2. **BULBOPHYLLUM**, Thouars.

Epiphytes. Rhizome creeping, often matted, usually more or less clothed with scarious sheathing scales. Pseudobulbs sessile in the axils of the scales, each crowned with 1 or rarely 2 leaves.

Flowers small or large, solitary, spiked or racemed on a peduncle arising from the base of the pseudobulbs. Sepals nearly equal, the lateral ones adnate to the foot of the column. Petals usually smaller than the sepals. Lip contracted at the base and jointed on to the produced foot of the column, usually small and recurved, generally mobile. Column short, erect, produced at the base, often 2-aristate at the top. Anther terminal, lid-like, 2-celled; pollinia 4 (rarely 2), free, in pairs in each cell.

A genus of nearly 100 species, with its chief centre of distribution in tropical Asia, but also found in tropical Africa, Australia, New Zealand, and sparingly in South America.

Leaves $\frac{1}{2}$ –1 in. Peduncles 2–4-flowered. Lip orange-red.. 1. *B. tuberculatum*.
Leaves $\frac{1}{4}$ – $\frac{1}{2}$ in. Flowers solitary. Lip white 2. *B. pygmæum*.

1. *B. tuberculatum*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 336, and xxii. (1890) 488.—Forming densely matted patches on the trunks or branches of trees. Pseudobulbs $\frac{1}{4}$ – $\frac{1}{2}$ in. long, broadly oblong or nearly orbicular, almost smooth and unwrinkled when fresh, deeply rugose when dry, more or less clothed with white bullate scales. Leaves solitary on the pseudobulbs, $\frac{1}{2}$ –1 in. long, linear-oblong, acute at both ends, thick and fleshy, slightly concave above, midrib prominent beneath, striate, under-surface with minute whitish dots. Peduncles very slender, almost filiform, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, 2–4-flowered; pedicels short; bracts minute. Flowers $\frac{1}{6}$ in. long, white with a bright reddish-orange lip. Upper sepal oblong-lanceolate, subacute; lateral larger, triangular, broad at the base. Petals triangular, much smaller than the sepals. Lip almost as long as the sepals, hinged on to the produced base of the column; lamina oblong-ovate or subhastate, truncate at the base, concave, very thick and fleshy, lower part of disc with 2 minute raised ridges. Column very short, stout, 2-winged at the top. Capsule broadly oblong, $\frac{1}{8}$ in. long.—*B. exiguum*, *Buch. in Trans. N.Z. Inst.* xvi. (1884) 397 (not of *F. Muell.*).

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews*! Lower Waikato, *Carse*! East Cape district, *Kirk*. Hawke's Bay—Petane, *A. Hamilton*! Wellington—Palmerston North, *A. Hamilton*! SOUTH ISLAND: Nelson—Collingwood, *Dall*! April–May.

A charming little plant. It was referred by Mr. Buchanan to the Australian *B. exiguum*, and no doubt is closely allied to it, principally differing in the smaller size and more compact habit, shorter peduncles, shorter and broader sepals and petals, and broader and thicker bright orange-red lip.

2. *B. pygmæum*, *Lindl. Gen. et Sp. Orch.* 58.—Minute, forming densely matted carpets on the trunks of trees or on rocks. Pseudobulbs $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., globose or globose-depressed, glabrous, much wrinkled when dry. Leaves solitary on the pseudobulbs, springing from a minute circular sheath, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-oblong, obtuse, very thick and coriaceous, grooved down the middle and

minutely echinulate above, naked and longitudinally nerved beneath. Peduncles solitary from the base of the pseudobulbs, very short, $\frac{1}{3}$ – $\frac{1}{6}$ in. long, 1-flowered; bract minute. Flowers very minute, whitish. Upper sepal narrow-ovate, acute; lateral rather larger, broadly triangular. Petals shorter than the sepals, oblong, sub-acute. Lip clawed on to the projecting foot of the column; claw long; lamina ovate, obtuse, thickened, disc with indistinct ridges. Ovary broadly oblong, gibbous, minutely echinulate.—*A. Cunn. Precur.* n. 317; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 240; *Handb. N.Z. Fl.* 263. *B. ichthyostomum*, *Col. in Trans. N.Z. Inst.* xxvi. (1894) 319. *Dendrobium pygmæum*, *Smith in Rees Cyclop.* xi. n. 27.

NORTH AND SOUTH ISLANDS: From the North Cape to Otago; in the South Island chiefly on the western side. Sea-level to 1500 ft. November–February.

I do not see upon what grounds Mr. Colenso has separated his *B. ichthyostomum*. The type specimens in his herbarium appear to me to be typical *B. pygmæum*.

3. *EARINA*, Lindl.

Epiphytes. Stems tufted, simple, compressed; pseudobulbs wanting. Leaves distichous, alternate, narrow-linear. Flowers rather small, in terminal simple or branched bracteate racemiform panicles. Sepals about equal, spreading, free. Petals similar to the sepals. Lip affixed to the base of the column or its slightly produced foot, 3-lobed; lateral lobes small or large; middle lobe broad, entire or emarginate or 2-lobed. Column short, stout, sometimes produced at the base. Anther terminal, lid-like, 2-celled; pollinia 4, waxy, aggregated in pairs in each cell, free or cohering at the base by a short viscid appendage. Capsule oblong.

Besides the two species found in New Zealand, which are endemic, there are four others from the Pacific islands.

Slender. Panicles slender; flowers remote. Lip deeply 3-lobed; disc eglandular	1. <i>E. mucronata</i> .
Stout. Panicles stiff; flowers close. Lip very obscurely 3-lobed; disc with 2 ridges	2. <i>E. suaveolens</i> .

1. *E. mucronata*, Lindl. in *Bot. Reg.* sub. t. 1699.—Rhizome creeping. Stems numerous, 1–3 ft. long, slender, simple, pendulous or rarely erect, smooth, compressed and 2-edged, spotted. Leaves 3–6 in. long, $\frac{1}{6}$ – $\frac{1}{5}$ in. broad, narrow-linear, acuminate, flat, smooth, thin but coriaceous, very finely striate. Panicle terminal, slender, sparingly branched, 2–5 in. long, many-flowered; bracts clasping, striate. Flowers rather distant, sessile, $\frac{1}{4}$ in. diam. Sepals and petals linear-oblong, spreading, obtuse, pale-yellow. Lip darker yellow with a brownish-orange spot at the base, deeply 3-lobed; middle lobe broader than long, again divaricately 2-lobed; disc eglandular. Column short, stout. Pollinia attached at the base to a short caudicle. Capsule oblong, $\frac{1}{4}$ in. long.—*A. Cunn. Precur.*

n. 315; *Raoul, Choix*, 41; *Hook. Ic. Plant.* t. 431; *Hook. f. Fl. Nov. Zel.* i. 239; *Handb. N.Z. Fl.* 262. *E. quadrilobata*, *Col. in Trans. N.Z. Inst.* xv. (1883) 325.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Not uncommon in lowland districts throughout. Sea-level to 2000 ft. October-December.

2. *E. suaveolens*, *Lindl. Bot. Reg.* (1843) *Misc.* 61.—Stems stout, erect or pendulous, slightly compressed, 6–18 in. high. Leaves 2–4 in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, narrow-linear or narrow linear-lanceolate, acute, rigid, coriaceous, striate, midrib evident. Panicle terminal, stiff, 2–4 in. long, many-flowered; branches numerous, close-set; bracts sheathing, striate. Flowers sessile, much closer together than in *E. mucronata*, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., waxy-white with a yellow centre, very fragrant. Sepals ovate-oblong, obtuse. Petals rather broader, obovate, narrowed at the base. Lip erect at the base and then bent outwards, broad, concave, very obscurely 3-lobed, disc with 2 crescent-shaped glands towards the base, margins undulate. Column short, stout. Pollinia pyriform, attached to a short caudicle at the base.—*E. autumnalis*, *Hook. f. Fl. Nov. Zel.* i. 239; *Handb. N.Z. Fl.* 262. *E. alba*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 267. *Epidendrum autumnale*, *Forst. Prodr.* n. 319. *Cymbidium autumnale*, *Swartz in Nov. Act. Upsal.* vi. (1799) 72; *A. Rich. Fl. Nouv. Zel.* 169.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in lowland forests from the North Cape southwards. Sea-level to 2000 ft. March-June.

A handsome species, easily distinguished from *E. mucronata* by the shorter and stouter habit, more rigid leaves, denser panicles, waxy-white flowers, and almost entire lip, which has two raised ridges near the base. Mr. Colenso apparently published his *E. alba* under the supposition that *E. suaveolens* has no glands on the lip, but they are always present. Some notes on the fertilisation are given by Mr. G. M. Thomson in the *Trans. N.Z. Inst.* xi. 418.

4. *SARCOCHILUS*, R. Br.

Epiphytes. Stems short, rarely long; pseudobulbs wanting. Leaves distichous, flat, oblong or linear, coriaceous or fleshy. Flowers racemose or spicate; peduncles lateral. Sepals spreading, almost equal, free; the lateral ones often broader at the base and adnate to the produced foot of the column. Petals similar to the sepals or narrower. Lip attached to the base of the column, usually 3-lobed; lateral lobes small or large, fleshy or petaloid; middle lobe often greatly reduced; disc usually with callosities. Column erect, semiterete, not winged, produced at the base. Anther terminal, lid-like, 2-celled; pollinia 2, or 4 more or less connate in pairs, waxy, attached by a strap-shaped caudicle to the rostellum. Capsule linear or linear-oblong.

A genus of about 30 species, most of them from India, the Malay Archipelago, and Australia; a few from the Pacific islands, and one from New Zealand.

1. **S. adversus**, *Hook. f. Fl. Nov. Zel.* i. 241.—Roots numerous, long, wiry, terete. Stems short, 1–3 in. long, concealed by the imbricated sheathing bases of the leaves. Leaves few, distichous, spreading, 1–2½ in. long, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad, linear-oblong to elliptic-oblong, obtuse or subacute, jointed above the sheathing base, thick and coriaceous, dark-green, often spotted with purple. Peduncles 1–4 from the axils of the lower leaves, slender, strict, 1–2½ in. long, 5–15-flowered; pedicels slender, erect; bracts small, broadly ovate. Flowers small, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam, green spotted with purple. Sepals oblong-ovate, obtuse. Petals similar but slightly narrower. Lip as broad as long, obscurely 3-lobed, very concave, with a fleshy gland on each side; tip obtuse, somewhat hooded. Column very short, stout. Capsule linear-oblong, $\frac{1}{2}$ – $\frac{2}{3}$ in. long.—*Handb. N.Z. Fl.* 263. **S. breviscapa**, *Col. in Trans. N.Z. Inst.* xiv. (1882) 332.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Low-land districts from the North Cape southwards, not common. October–November.

5. **SPIRANTHES**, L. C. Rich.

Terrestrial herbs, with fibrous or tuberous roots. Stems leafy or sometimes leafless at the time of flowering. Flowers small, spirally arranged in a terminal spike. Sepals subequal; the dorsal one erect, more or less connivent with the petals into a hood; lateral free, erect or spreading. Lip sessile or clawed, concave, closely embracing the column at its broad base, often spreading and dilated at the tip; disc usually with tubercles or lamellæ near the base. Column short, terete. Anther erect, ovate or oblong, 2-celled; pollinia after dehiscence pendulous from the gland of the rostellum.

A genus of about 80 species, generally dispersed through most temperate or tropical regions.

1. **S. australis**, *Lindl. in Bot. Reg.* t. 823.—Root of several stout and fleshy almost tuberous fibres. Stem variable in size, 6–20 in. high, stout or slender, glabrous or nearly so below the inflorescence. Lower leaves varying from 2 to 6, 2–6 in. long, narrow-linear or linear-lanceolate, acuminate, sheathing at the base; upper ones reduced to sheathing scales. Spike slender, 2–6 in. long or more, spirally twisted, glandular-pubescent. Flowers numerous, small, sessile, close-set or rather distant, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, rose-pink or white; bracts ovate, acuminate, usually as long as the flowers. Upper sepal oblong, obtuse, connivent with the petals into a hood; lateral free, acute. Lip broadly oblong, concave; the lower part embracing the column and bearing a small rounded gland on each side at the

base; upper part spreading and thickened; margins usually much crisped. Ovary glandular.—*Hook. f. Fl. Tasm.* ii. 15; *Handb. N.Z. Fl.* 272; *Benth. Fl. Austral.* vi. 314. *S. novæ-zealandiæ*, *Hook. f. Fl. Nov. Zel.* i. 243.

NORTH ISLAND: Auckland—Near Ohora, *T. F. C.*; Kaitaia, *R. H. Matthews*! Great Barrier Island, *Kirk*; near Auckland, *T. F. C.*; Upper Waikato, *Colenso*; Rotorua, *T. F. C.* Taranaki—Swamps near New Plymouth; Ngairu Swamp, *T. F. C.* SOUTH ISLAND: Okarito, *A. Hamilton*. Sea-level to 1500 ft. January–February.

Also found in Australia, and in many parts of tropical and temperate Asia.

6. THELYMITRA, Forst.

Terrestrial herbs, usually glabrous. Root of oblong or ovoid tubers. Leaf solitary, linear or lanceolate, often thick and fleshy but not terete; empty sheathing bracts 1 or 2 along the stem. Flowers few or many in a terminal raceme, sometimes reduced to one. Sepals and petals similar and equal or nearly so, spreading. Lip similar to the petals, quite free from the column at the base. Column short, erect, broadly 2-winged; the wings either produced behind the anther with a variously lobed or fringed or rarely entire margin, or with 2 prominent lateral lobes as long or longer than the anther; at the base the wings extend between the column and the lip and are united. Anther in front of the produced wing of the column or between its lateral lobes, erect, 2-celled; connective often produced; pollinia 2 in each cell, friable.

A genus of probably over 30 species, mostly natives of Australia and New Zealand, one species only being found in New Caledonia, and two in the Malay Archipelago. It is remarkable from the lip being quite free from the column and resembling the petals and sepals, so that the perianth has little of the irregular appearance of an orchid, but rather resembles that of an *Ixia* or *Sisyrinchium*. The New Zealand species are much alike in habit and general appearance, and in most cases cannot be distinguished from one another when out of flower, or when dried. Even when in the flowering state they require careful study before their differential characters can be understood. The following analysis is in several respects imperfect, but is the best that I can offer in the present state of our knowledge. I have in my herbarium specimens of at least three additional forms, but they cannot be safely described until more complete material is available.

A. Cucullaria. Column-wing extending behind the anther and usually overtopping it, hood-shaped, variously lobed or fringed, the lateral lobes tipped with a dense brush of cilia.

- | | |
|---|---------------------------|
| Column-wing with 3 short denticulate or fimbriate lobes at the back between the lateral lobes | 1. <i>T. ixioides</i> . |
| Column-wing with a broad entire or emarginate lobe between the lateral lobes, which are shorter than it .. | 2. <i>T. longifolia</i> . |
| Column-wing with a truncate or bifid scarcely hood-shaped lobe between the lateral lobes, which are longer than it | 3. <i>T. intermedia</i> . |
| Column-wing with a hood-shaped lobe between the lateral lobes, which are much longer than it. Sepals and petals linear-oblong | 4. <i>T. Colensoi</i> . |

B. Macdonaldia. Column-wing extending behind the anther but shorter than it and not hood-shaped, variously lobed or crenate or fimbriate.

Tall, slender, 9–18 in. high. Flowers 3–8, large, $\frac{3}{4}$ –1 in. diam., blue-purple 5. *T. pulchella*.
 Flexuous and wiry, 4–10 in. high. Flowers 1–3, $\frac{1}{2}$ in. diam., flesh-coloured 6. *T. imberbis*.

C. Biaurella. Column-wing not extending behind the anther, but with 2 prominent erect lateral lobes.

Flowers 3–6. Lateral lobes of the column-wing exceeding the short broad anther 7. *T. venosa*.
 Flowers 1–4. Lateral lobes of the column-wing not so long as the rather narrow anther 8. *T. uniflora*.

T. concinna and *T. nervosa*, Col. in Trans. N.Z. Inst. xx. (1888) 207, and *T. fimbriata*, l.c. xxii. (1890) 490, are unknown to me.

1. ***T. ixioides***, Swz. in Vet. Akad. Handl. Stockh. xxi. (1800) 228, t. 3.—Stem slender, 9–18 in. high. Leaf rather long but shorter than the stem, narrow-linear, thick, channelled in front. Flowers 2–8 or more in a raceme 2–6 in. long, rather large, $\frac{3}{4}$ –1 in. diam. Sepals, petals, and lip broadly oblong or elliptic-oblong, obtuse or subacute. Column short, stout, not half as long as the perianth; the broad wing continued behind the anther and overtopping it, 3-lobed at the back and with a lateral lobe on each side at the front angle; lateral lobes the highest, pointing forwards and upwards, linear, tipped with a small dense tuft of cilia; the 3 intermediate lobes broader and shorter, truncate, denticulate or crenate, the middle one usually crested on the back. Anther rather narrow, pointed, much longer than the rostellum.—*Hook. f. Fl. Tasm.* ii. 6, t. 103B; *Benth. Fl. Austral.* vi. 317; *Fitzgerald, Austral. Orchid.* ii. pt. 3; *Berggr. in Minneskr. Fisiog. Sällsk. Lund.* (1877) 22.

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews!* Whangaroa, *Petrie!* Bay of Islands, *Berggren!* Te Aroha and Rotorua, *Petrie!* (specimens not in a fit state for accurate determination, but apparently the same). September–November. Also in Australia.

2. ***T. longifolia***, *Forst. Char. Gen.* 98, t. 49.—Very variable in size and degree of robustness, stout or slender, 3–18 in. high. Leaf short or long, often overtopping the flowers in short-stemmed specimens, narrow-linear or linear-lanceolate, varying in breadth from $\frac{1}{8}$ to $\frac{3}{4}$ in. or even more, flat or involute, thick and coriaceous or fleshy, grooved and nerved. Flowers 2–16 in a raceme 1–6 in. long or sometimes solitary, variable in size, $\frac{1}{3}$ – $\frac{3}{4}$ in. diam., colour varying from white to pink or blue. Sepals and petals oblong-ovate or ovate-lanceolate, acute or acuminate; lip usually broader and more obtuse. Column short, stout; the wing continued behind the anther and much longer than it, 3-lobed; the middle lobe the highest, broad, rounded, hood-shaped and projecting forwards over the anther, emarginate or shallowly 2-lobed, margins smooth,

entire; lateral lobes short, linear, terminated by a dense brush of white cilia. Anther much exceeding the rostellum.—*Hook. f. Handb. N.Z. Fl.* 270; *Benth. Fl. Austral.* vi. 319; *Fitzgerald, Austral. Orch.* i. pt. 6. *T. Forsteri*, *Swz. in Vet. Akad. Handl. Stockh.* xxi. (1800) 228; *A. Rich. Fl. Nouv. Zel.* 165, t. 25, f. 2; *A. Cunn. Precur.* n. 309; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 243. *T. stenopetala*, *Hook. f. Fl. Antarct.* i. 69. *T. nemoralis* and *T. purpureo-fusca*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 249. *T. alba*, *Col. l.c.* xviii. (1886) 272. *T. cornuta*, *Col. l.c.* xx. (1888) 206.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 4000 ft. *Makaika*. November–December. Also in Australia and Tasmania.

Found in all soils and situations (except in the dense forest) and correspondingly variable. Its best distinguishing character is the large middle lobe of the column-wing, which forms a smooth rounded hood projecting over the anther and usually overtopping the lateral lobes, which are most densely ciliate at the tips. For an account of the fertilisation, see a paper by myself in *Trans. N.Z. Inst.* xiii. 291.

3. ***T. intermedia***, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 21, t. 5, f. 21–24.—Size and habit altogether that of slender forms of *T. longifolia*, and flowers similar in general appearance. Column-wing continued behind the anther and 3-lobed as in *T. longifolia*; but the intermediate lobe is much shorter, so that the tip of the anther is exerted beyond it, and the anterior angle on each side is incurved and acute; the lateral lobes longer, erect, exceeding the intermediate lobe, terminated by a much smaller and less dense tuft of cilia.

NORTH ISLAND: Bay of Islands, *Berggren*.

I only know this through Dr. Berggren's figure and description. It may be the same as the following, but that is a question that can only be settled by actual comparison of the types.

4. ***T. Colensoi***, *Hook. f. Handb. N.Z. Fl.* 271.—“Very slender, 8–12 in. high. Leaf very narrow-linear, flexuous. Flowers 1–3, yellowish, on slender pedicels, $\frac{1}{2}$ in. broad. Sepals and petals very narrow, linear-oblong, acute. Column very short; appendages very long, subulate, erect, plumose at the tip. Anther with a long point.”—*T. pauciflora*, *Hook. f. Fl. Nov. Zel.* i. 244 (not of R. Br.).

NORTH ISLAND: *Colenso* (Handbook).

I have seen no specimens that I can refer to this, and in the absence of any additional information have reproduced the description given in the Handbook.

5. ***T. pulchella***, *Hook. f. Fl. Nov. Zel.* i. 244.—Stem tall, slender, often flexuous, 9–18 in. high or even more. Leaf shorter than the stem, long, linear, fleshy, grooved and channelled; empty

bracts 2 or 3, sheathing. Flowers 3-8 in a raceme from 2 in. to 6 in. long, large, handsome, blue-purple, $\frac{3}{4}$ -1 in. diam. Sepals, petals, and lip broadly oblong or obovate, obtuse. Column less than half as long as the perianth, the wing continued behind the anther but much shorter than it, 3-lobed; middle lobe short and broad, emarginate or truncate; lateral lobes much longer than the middle lobe and almost equalling the anther, erect, lanceolate, acuminate, coarsely toothed. Anther broad, connective produced into a stout horn-like point.—*Handb. N.Z. Fl.* 271.

NORTH ISLAND: Clay hills from the North Cape to the Waikato River, not uncommon. November-December.

A well-marked species, easily distinguished by the large blue-purple flowers, broad obtuse sepals and petals, long erect coarsely jagged (not ciliate) lateral lobes of the column-wing, and broad and short middle lobe, which is much lower than the anther. I have seen no South Island specimens, and suspect that Monro's and Lyall's plants, mentioned by Hooker in the Handbook, are nothing more than large states of *T. uniflora*.

6. *T. imberbis*, *Hook. f. Fl. Nov. Zel.* i. 244.—Stem slender, wiry, often flexuous, 4-12 in. high. Leaf much shorter than the stem, narrow-linear, flexuous, thick and fleshy, grooved in front. Flowers 1-3, rarely more, short and broad, cup-shaped, $\frac{1}{2}$ in. diam., flesh-coloured. Sepals and petals $\frac{1}{3}$ in. long, broadly oblong or obovate-oblong, obtuse or apiculate. Column less than half as long as the perianth; the wing continued behind the anther but shorter than it, 3-lobed; middle lobe broad, truncate or obscurely 2-lobed, minutely warted on the back, margin thick, entire; lateral lobes longer, pointing forwards and upwards, triangular, acute, irregularly denticulate, without cilia. Anther large, connective produced into a blunt point much exceeding the column-wing.—*Handb. N.Z. Fl.* 271.

NORTH ISLAND: Clay hills from the North Cape to Rotorua, not uncommon. Sea-level to 1500 ft. October-November.

In the original description the flowers are said to be yellow, but they are flesh-coloured in all the specimens I have seen. It is probably identical with the Australian *T. carnea*, R. Br.

7. *T. venosa*, R. Br. *Prodr.* 314.—Stem stout or slender, 9-18 in. high or more. Leaf shorter than the stem, narrow-linear, thick, channelled. Flowers 3-6, large, handsome, purplish-blue, 1 in. diam. Sepals and petals $\frac{1}{2}$ in. long, oblong or elliptic-oblong, obtuse or minutely apiculate, conspicuously veined; lip obovate, obtuse. Column short, stout, not half the length of the perianth; wing not continued behind the anther but with 2 erect lateral lobes which exceed the anther, lobes narrow-triangular, 1-2-toothed near the tip, which is usually twisted inwards. Anther rather short, ovate, connective narrowed into a short bifid beak not so long as the lateral lobes.—*Benth. Fl. Austral.* vi. 323. *Epiblema grandiflorum*, *Buch. in Trans. N.Z. Inst.* xiv. (1882) 357 (not of R. Br.).

NORTH ISLAND: Auckland—Swamps in the Upper Waikato, *T. F. C.*; Omatangi, near Lake Taupo, *Berggren*! Taranaki—Ngaire Swamp, *T. F. C.* Wellington—Mungaroa Swamp, *Travers, Kirk*!

Very near to *T. uniflora* in the structure of the flower, but a taller and stouter plant, with numerous larger flowers, and with the lateral lobes of the column exceeding the anther. The late Mr. Buchanan informed me that it was the plant he referred to *Epiblema* in *Trans. N.Z. Inst.* xiv. It probably occurs in the South Island, but I have seen no specimens from thence. It is found in several localities in New South Wales.

8. ***T. uniflora***, *Hook. f. Fl. Antarct.* i. 70.—Stem slender, 6–12 in. high or more. Leaf much shorter than the stem, very narrow-linear, channelled. Flowers 1–4, large, handsome, blue-purple, $\frac{3}{4}$ in. diam. Sepals and petals obovate-oblong, obtuse or apiculate, veined; lip broader, obovate. Column short and stout, less than half the length of the perianth; wing reduced to 2 linear-triangular lateral lobes not connected by a rim or crest behind the anther, tip obscurely notched, usually twisted inwards. Anther large, broadly ovate, the connective produced into a bifid beak which overtops the column-lobes.—*Fl. Nov. Zel.* i. 244; *Handb. N.Z. Fl.* 271.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: From Rotorua southwards, chiefly in upland districts. Sea-level to 3500 ft. December–January.

The name *uniflora* is misleading, as the flowers are often more than one. It is very closely allied to the Tasmanian *T. cyanea*, *Lindl.*, and may prove identical with it.

7. **ORTHOCERAS**, *R. Br.*

Glabrous terrestrial herbs. Root of 1 or 2 ovoid tubers and numerous fleshy fibres. Leaves few, near the base of the stem, narrow-linear. Flowers rather large, sessile in a lax spike; bracts sheathing, acute. Upper sepal erect, incurved, deeply concave; lateral longer, narrow-linear or almost filiform, terete, erect. Petals short, erect, narrow, flat. Lip affixed to the base of the column, spreading, 3-lobed; lateral lobes broad; middle lobe large, ovate; disc with a thick callus. Column short, stout, upper part with 2 lateral erect lobes equalling the anther. Anther large, erect or slightly incurved, 2-celled; pollinia powdery.

One species only is known, found in both Australia and New Zealand.

1. ***O. strictum***, *R. Br. Prodr.* 317.—Stem stout or slender, rigid, erect, wiry, 9–24 in. high. Leaves several near the base of the stem, sheathing. 2–9 in. long, linear or almost filiform, channelled, margins involute; above the leaves there are usually 2 or 3 long sheaths with short erect laminæ. Spike 1–9 in. long, 3–12-flowered; flowers rather lax, green, greenish-purple or brownish-purple; bracts acuminate, the lower ones usually exceeding the

ovary. Upper sepal $\frac{1}{3}$ – $\frac{1}{2}$ in. long, when spread out almost orbicular, much incurved, deeply concave; lateral filiform, erect or diverging, $\frac{1}{2}$ –1 in. long. Petals thin, notched at the tip. Lip spreading or deflexed; lateral lobes broad, oblique; middle lobe much larger, ovate; disc with a large variously shaped callus.—*A. Cunn. Precur.* n. 310; *Benth. Fl. Austral.* vi. 332; *Fitzgerald, Austral. Orch.* i. pt. 3. *O. Solandri*, *Lindl. Gen. et Sp. Orch.* 512; *Hook. f. Fl. Nov. Zel.* i. 243; *Handb. N.Z. Fl.* 273. *O. rubrum*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 273. *O. caput-serpentis*, *Col. l.c.* xxii. (1890) 490. *Diuris novæ-zealandiæ*, *A. Rich. Fl. Nouv. Zel.* 163, t. 25, f. 1.

NORTH ISLAND: Dry hills from the North Cape southwards, not uncommon. SOUTH ISLAND: Various localities in the Nelson Provincial District, *Pidwill, Kirk! T. F. C.* Sea-level to 2500 ft. December–January.

8. MICROTIS, R. Br.

Glabrous terrestrial herbs; root of rounded tubers on fleshy fibres. Leaf solitary, long, narrow, terete, opened out near the stem and then continuous with the closed sheath. Flowers small, green, numerous, densely spicate, usually spreading or reflexed. Upper sepal erect, broad, concave, incurved; lateral lanceolate or oblong, spreading or recurved. Petals similar to the lateral sepals or smaller. Lip sessile at the base of the column, spreading, oblong, obtuse, truncate or 2-lobed, usually with calli near the base. Column very short, almost terete, upper part with 2 auricles or wings. Anther terminal, erect, 2-celled; pollinia 4, powdery.

The genus consists of 6 species inhabiting Australia, one of them extending to New Zealand. A seventh species has also been described from the Malay Archipelago. The genus has the habit and general appearance of *Prasophyllum*, but differs in the flowers not being reversed, and in the auricles of the column.

1. *M. porrifolia*, *R. Br. Prodr.* 320.—Very variable in size, degree of robustness, and number of flowers. Stems stout or slender, 3–24 in. high. Leaf terete, fistular, exceeding the spike or shorter than it. Spike $\frac{1}{2}$ –6 in. long; flowers few or many, close-set or rather distant, minute, green, pedicels short; bracts small. Upper sepal broadly ovate, acute, deeply concave; lateral oblong, deflexed. Petals shorter, spreading. Lip horizontal or deflexed, oblong, obtuse or 2-lobed; margins much crisped; disc with 2 calli at the base and usually with an irregularly shaped tubercle or swelling near the tip. Column very short, stout; upper part with 2 small auricles. Pollinia attached to a very short caudicle.—*Hook f. Fl. Nov. Zel.* i. 245; *Handb. N.Z. Fl.* 266; *Benth. Fl. Austral.* vi. 347; *Fitzgerald, Austral. Orch.* ii. pt. i. *M. Banksii*, *A. Cunn. Bot. Mag.* sub. t. 3377; *Precur.* n. 311; *Raoul, Choix*, 41. *M. longifolia*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 247. *M. papillosa*, *Col. l.c.* xviii. (1886) 269. *Epipactis porrifolia*, *Swz. in Vet. Acad. Stockh.* (1800) 233. *Ophrys unifolia*, *Forst. Prodr.* n. 311.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 2500 ft. October-December.

There appear to be differences in the shape and size of the calli on the lip, the shape of its extremity, and the extent to which the margin is crisped. The fertilisation has been described by Thomson in Trans. N.Z. Inst. xi. 422.

9. PRASOPHYLLUM, R. Br.

Terrestrial glabrous herbs. Root of globose or ovoid tubers. Leaf solitary; sheath usually long; lamina terete, long or short, sometimes reduced to a short erect point. Flowers small, sessile in a lax or dense spike, reversed so that the lip is uppermost, usually abruptly bent at the top of the ovary and consequently spreading or reflexed. Upper sepal (inferior by the reversion of the flower) lanceolate or oblong, concave, usually arched over the column; lateral (superior) as long or rather longer, lanceolate or linear, free or more or less connate. Petals equalling the sepals or shorter, lanceolate or linear. Lip superior, sessile or shortly clawed, or sessile on the produced foot of the column, usually erect at the base and concave, spreading or recurved above, ovate or lanceolate, undivided; margins entire or undulate; disc with an adnate plate or longitudinally thickened along the median line. Column very short, not winged, but furnished with 2 erect lateral lobes; rostellum usually long, erect. Anther erect, placed behind the rostellum which often exceeds it, 2-celled; pollinia attached by a linear caudicle to the rostellum.

Species about 30, all confined to Australia, with the exception of one from New Caledonia and four from New Zealand, two of which seem to be the same as Australian species. The genus is closely allied to *Microtis*, but is at once distinguished by the reversed flowers and large lateral lobes to the column.

A. Euprasophyllum. Lip sessile at the base of the column. Perianth $\frac{1}{2}$ – $\frac{1}{2}$ in. long.

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|---|-----|-----|-----|-------------------------|
| Tall, 1–3 ft. high. Flowers $\frac{1}{4}$ – $\frac{1}{2}$ in. Lip large, with a conspicuous recurved lamina; adnate plate not nearly reaching the tip | ... | ... | ... | 1. <i>P. patens</i> . |
| Smaller, 4–12 in. Flowers $\frac{1}{5}$ in. Lip shorter, with a smaller recurved lip; adnate plate extending almost to the tip. | ... | ... | ... | 2. <i>P. Colensoi</i> . |

B. Genoplesium. Leaf reduced to a sheathing bract just under the spike. Lip articulated on to a flat ribband-like projection from the base of the column, usually mobile. Flowers very small, $\frac{1}{10}$ – $\frac{1}{12}$ in. long.

- | | |
|---|------------------------|
| Perianth pointing downwards, green. Lateral sepals ovate-lanceolate, not tipped with a gland. Lip oblong | 3. <i>P. pumilum</i> . |
| Perianth horizontal, reddish. Lateral sepals narrow-lanceolate, acuminate, tipped by a minute gland. Lip lanceolate | 4. <i>P. rufum</i> . |

1. *P. patens*, *R. Br. Prodr.* 318.—Stem stout or slender, 1–3 ft. high. Leaf sheathing the stem half-way up or rather more, the lamina shorter or longer than the spike. Spike rather lax, 2–5 in. long, many-flowered; bracts small, broad, obtuse. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. long, pale yellowish-green or whitish, sweet-scented. Ovary obovoid. Upper sepal ovate, acute, concave; lateral rather longer, lanceolate, quite free. Petals linear-oblong, obtuse. Lip sessile, as long as the sepals, erect at the base and then suddenly reflexed between the lateral sepals; adnate plate narrower than the disc and not extending much further up than the flexure of the lip; margins broad, thin, undulate. Column short; lateral lobes linear-oblong, obtuse, almost as long as the narrow erect rostellum, entire. Anther large, pointed, not quite equalling the rostellum.—*Hook. f. Fl. Tasm.* ii. 11, t. 111; *Benth. Fl. Austral.* vi. 339.

NORTH ISLAND: Auckland—Swamps at Maungatapere, Whangarei, *Carse!* Great Barrier Island, *Kirk!* Taranaki—Ngairi Swamp, abundant, *T. F. C.* December–January.

Easily distinguished from *P. Colensoi* by the much greater size, larger paler flowers, and longer lip, which has a much more conspicuous recurved lamina, the adnate plate not extending to the tip. The lateral lobes of the column are also much longer. It agrees well with Australian specimens of *P. patens*, except that the spike is usually denser.

2. *P. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 241.—Stem stout or slender, erect, 4–14 in. high. Leaf sheathing the stem for three-quarters its length or even more; lamina shorter than the spike or equalling it. Spike 1–3 in. long, many-flowered; bracts as short as the pedicel, broad, obtuse. Flowers about $\frac{1}{5}$ in. long, dull-green or greenish-brown, slightly fragrant; ovary obovoid, gibbous. Upper sepal ovate-oblong, acute, concave; lateral rather longer, connate at the very base, lanceolate, acute, curved backwards. Petals linear-oblong, obtuse. Lip shorter than the sepals, sessile, ovate, tip acuminate, shortly recurved, adnate plate extending almost to the tip, margins undulate. Column very short, lateral lobes broadly notched, shorter than the rostellum. Anther broad, obtuse, not equalling the rostellum.—*Handb. N.Z. Fl.* 272. (?) *P. pauciflorum*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 273.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, ANTIPODES ISLAND: From the North Cape southwards, but rare and local to the north of Lake Taupo. Sea-level to 4500 ft. November–January.

A most abundant subalpine plant all through the mountains of the South Island. For some remarks on the fertilisation, see a paper by Mr. Thomson in the *Trans. N.Z. Inst.* xi. 425.

3. *P. pumilum*, *Hook. f. Fl. Nov. Zel.* i. 242.—Very slender, 6–16 in. high. Stem with a lacerated fibrous sheath at the base. Leaf reduced to a sheathing bract near the spike; lamina $\frac{1}{2}$ –1 in. long, erect, usually reaching about half-way up the spike. Spike

dense, few- or many-flowered, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long. Flowers minute, the perianth about $\frac{1}{10}$ in. long, curved, pointing downwards, greenish. Upper sepal ovate, acuminate, concave; lateral rather longer, free, ovate-lanceolate, acuminate. Petals the same shape as the lateral sepals, but shorter, and with the tips almost aristate. Lip articulate on a flat ribband-like projection from the foot of the column, mobile, oblong, acute, truncate at the base, not ciliate, disc almost wholly occupied by a thick adnate plate, which is obscurely 3-grooved towards the base. Column short, the lateral lobes broad, obliquely truncate and irregularly 2–3-notched at the tip. Anther large, apiculate, overtopping the small rostellum.—*Handb. N.Z. Fl.* 273.

NORTH ISLAND: Auckland—Dry hills from the North Cape to the Middle Waikato, not common. April–June.

4. *P. rufum*, *R. Br. Prodr.* 319.—Very similar in size and habit to *P. pumilum*, and like it with the leaf reduced to a sheathing bract just below the spike, the lamina very short and subulate. Spike few- or many-flowered, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Flowers still more minute than in *P. pumilum*, the perianth about $\frac{1}{12}$ in. long, horizontal, reddish or yellowish. Upper sepal ovate, acuminate, concave; the lateral much longer, quite free, lanceolate, acuminate, the points tipped with a small gland. Petals small, lanceolate, shorter than the upper sepal. Labellum articulate on a flat ribband-like projection from the foot of the column, mobile, lanceolate, acute, truncate at the base, adnate plate occupying most of the disc, thickest along the margins. Column very short, the lobes rather narrow, 2-toothed at the tip. Anther large, apiculate, overtopping the small rostellum.—*Benth. Fl. Austral.* vi. 344; *Fitzgerald, Austral. Orch.* ii. pt. 4. *P. nudum*, *Hook. f. Fl. Nov. Zel.* i. 242; *Handb. N.Z. Fl.* 272. *P. tunicatum*, *Hook. f. Fl. Nov. Zel.* i. 242. (?) *P. variegatum*, *Col. in Trans. N.Z. Inst.* xx. (1888) 208.

NORTH ISLAND: "Te Hawara, Port Nicholson, and Lake Taupo, Colenso" (*Handbook*). SOUTH ISLAND: Marlborough—Port Underwood and Keneperu, *Macmahon!*

The above description is drawn up from Mr. Macmahon's specimens, which correspond fairly well with the plate of *P. rufum* given by Mr. Fitzgerald in his "Australian Orchids." It is distinguished from the preceding species by the smaller horizontal usually reddish flowers, narrower lateral sepals tipped by a minute gland, much narrower lip, the adnate plate on which is thickest on the edges, and in the narrower lateral lobes of the column.

10. *CALEANA*, *R. Br.*

Glabrous terrestrial herbs. Root of small rounded tubers on fleshy fibres. Leaf solitary, linear or lanceolate or oblong. Flowers solitary or 2–4 in a terminal raceme; bracts acute. Sepals and petals subequal, all linear; the upper sepal erect, the lateral sepals and petals spreading or deflexed (but the position apparently re-

versed through the ovary being recurved). Lip uppermost, jointed on to the base of the column or to a projection from it, mobile; claw linear, incurved; lamina ovate or oblong, peltate, undivided, entire, smooth or tuberculate. Column elongate, sometimes produced at the foot, broadly winged throughout its whole length, concave. Anther terminal, erect, 2-celled; pollinia 2-partite, granular.

A small genus of 4 species, all of them natives of Australia, 1 extending to New Zealand.

1. **C. minor**, *R. Br. Prodr.* 329.—Stem slender, wiry, almost filiform, 2–8 in. high, usually tinged with red. Leaf radical, about half as long as the stem, rather fleshy, channelled. Flowers 1–4, about $\frac{1}{2}$ in. long including the ovary, greenish tinged with red, reversed; pedicels $\frac{1}{4}$ – $\frac{1}{2}$ in.; bracts minute, acute. Sepals and petals narrow-linear, slightly dilated above the middle, nearly equal; upper sepal attached just above the top of the ovary, the lateral affixed to the basal projection of the column. Lip uppermost, very remarkable in shape; the lower portion claw-like and articulated on to the basal projection of the column; the upper part expanded into a broad lamina which is peltately attached to the claw; lamina convex above and covered with close-set reddish tubercles, which are largest towards the margins, under-surface smooth, concave. Column rather long, with a broad basal projection, broadly winged all round, concave, forming a horizontally placed cup or pouch.—*Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 411; *Kirk, l.c.* 425; *Benth. Fl. Austral.* vi. 366.

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews!* Rotorua, *Rev. F. H. Spencer!* Waioapu, *H. J. Matthews!* December–January.

A most remarkable little plant. The column is horizontally placed, forming a broad pouch; the lamina of the lip, when at rest, is elevated by the slender elastic claw, and swings directly above it. When an insect alights on the lamina it overbalances, shutting up the insect within the concavity of the column. For a full account of the fertilisation of the genus, reference should be made to Mr. Fitzgerald's magnificent work on Australian Orchids (Vol. i. pt. 6).

11. **PTEROSTYLIS**, *R. Br.*

Terrestrial leafy herbs. Root of small rounded tubers on long fleshy fibres. Leaves radical and cauline, either all similar or the radical broader and ovate or oblong, often subrosulate; the cauline lanceolate or linear or reduced to sheathing bracts. Flowers large or small, greenish, usually solitary, rarely several in a terminal raceme. Upper sepal erect, incurved, concave, conniving with the petals and forming a broad boat-shaped hood (*galea*). Lateral sepals adnate at the base to the foot of the column, more or less connate into an erect or recurved 2-lobed lower lip; the lobes often drawn out into long acuminate points. Petals lanceolate, falcate.

Lip attached by a short claw to the basal projection of the column, mobile; lamina linear or oblong, produced at the base above the claw into a long or short usually curved appendage. Column elongated, incurved, furnished on each side of the rostellum with a quadrangular or hatchet-shaped membranous wing, the base produced into a horizontal projection. Stigma on the face of the column below the wings, oblong. Anther terminal, erect, 2-celled; pollinia 4, granular, free.

About 40 species are known. Of the 11 found in New Zealand, 2 are common Australian plants, the others are endemic. The remainder of the genus is Australian, with the exception of one species in New Caledonia. The mode of fertilisation is most curious, and is well worth an attentive study. The upper sepal and petals connive, and form a hood, at the back of which the column is situated. The irritable lip hangs out of the entrance to the flower, and forms a convenient landing-place for insects. When touched by an insect it springs up, carrying the insect with it, and imprisoning it within the flower. The insect can only escape by crawling up the column and passing between the two membranous projecting wings, emerging directly in front of the anther. In doing this, it is first smeared with viscid matter from the projecting rostellum, and then drags away the pollinia, which can hardly fail to adhere to its sticky body. When visiting another flower, it must pass over the stigma before escaping, and is almost certain to leave some of the pollinia on its viscid surface. For a fuller account, see a paper by myself in Trans. N.Z. Inst. v. 352.

A. Antennææ. Lower lip erect, its lobes narrowed into long points embracing the galea.

* No broad radical leaves. Cauline leaves linear, grass-like, sheathing the whole stem.

- | | |
|--|--------------------------|
| Tall, 6-18 in. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in. broad. Flower large, 2-3 in. long; sepals and petals produced into long filiform points | 1. <i>P. Banksii</i> . |
| Short, stout, 4-10 in. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in. broad. Flower small, $\frac{3}{4}$ - $1\frac{1}{4}$ in. long; sepals and petals with short subulate points | 2. <i>P. australis</i> . |
| Slender, 4-10 in. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in. broad. Flower small, $\frac{1}{4}$ - $\frac{3}{4}$ in. long; sepals and petals with short subulate points | 3. <i>P. graminea</i> . |

** Radical leaves broad, oblong to ovate or orbicular, few or numerous and rosulate. Cauline leaves narrow, often reduced to sheathing bracts.

- | | |
|--|----------------------------|
| Slender, 4-12 in. Lower leaves $\frac{1}{2}$ - $1\frac{1}{2}$ in., oblong; cauline 2-5, lanceolate, flat. Flower $\frac{3}{4}$ - $1\frac{1}{2}$ in.; galea not decurved | 4. <i>P. micromega</i> . |
| Stout or slender, 6-12 in. Lower leaves large, $1\frac{1}{2}$ - $3\frac{1}{2}$ in., broadly oblong; cauline few, large, flat. Flower $1\frac{1}{2}$ in., galea much decurved at the tip | 5. <i>P. Oliveri</i> . |
| Stout, glabrous, 2-8 in. Lower leaves subrosulate, $1\frac{1}{2}$ - $1\frac{3}{4}$ in., elliptic-oblong; cauline of 1 or 2 sheathing bracts. Flower $\frac{3}{4}$ in.; galea arched but not decurved | 6. <i>P. foliata</i> . |
| Small. 2-3 in. Lower leaves 2 or 3, large, $\frac{3}{4}$ -2 in., broadly oblong; cauline wanting. Flower $\frac{1}{2}$ - $\frac{3}{4}$ in. | 7. <i>P. venosa</i> . |
| Slender, glabrous, 2-8 in. Lower leaves long-petioled; blade $\frac{1}{2}$ - $\frac{1}{2}$ in., ovate; cauline narrow, flat. Flower $\frac{1}{2}$ -1 in. | 8. <i>P. trullifolia</i> . |
| Puberulous, 2-6 in. Lower leaves short-petioled; blade small, ovate; cauline of 2-4 sheathing bracts. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ in. | 9. <i>P. puberula</i> . |

B. Catochilus. Lower lip reflexed. Basal appendage of lip entire, obtuse.

Leaves ovate-lanceolate. Flower solitary, large, $\frac{3}{4}$ –1 in.

long; lip filiform, clothed with golden-yellow hairs .. 10. *P. barbata*.

Leaves ovate. Flowers 2–8, small, $\frac{1}{2}$ in. long; lip oblong,

obtuse, glabrous 11. *P. mutica*.

1. ***P. Banksii***, *R. Br. ex A. Cunn. in Bot. Mag.* t. 3172.—Tall, slender, leafy, grassy, 6–18 in. high. Lower leaves reduced to scarious sheathing scales; cauline numerous, sheathing the whole stem, usually overtopping the flower but often shorter than it, 3–14 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, narrow linear-lanceolate, acuminate, pale-green. Flower solitary, large, 2–3 in. long including the tails to the lateral sepals, green, often streaked with red or reddish-brown. Galea erect at the base and then curved forwards; upper sepal produced into a long caudate often filiform point; petals also caudate-acuminate or shortly filiform, but always much shorter than the upper sepal. Lower lip with the entire part broadly cuneate, the free lobes gradually narrowed into long filiform erect tails 1–2 in. long. Lip narrow linear-oblong, obtuse, its tip slightly exserted; basal appendage curved, repeatedly divided and penicillate at the tip. Column slender, more than half the length of the galea, upper lobe of wings with an erect subulate tooth at the outer angle; lower lobe narrow-oblong, obtuse.—*A. Cunn. Precur.* n. 313; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 248; *Handb. N.Z. Fl.* 268. *P. emarginata*, *Col. in Trans. N.Z. Inst.* xv. (1883) 328. *P. patens*, *Col. l.c.* xviii. (1886) 270. *P. speciosa*, *Col. l.c.* xxii. (1890) 488. *P. auriculata*, *Col. l.c.* 489. *P. subsimilis*, *Col. l.c.* xxviii. (1896) 611.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in shaded places from the North Cape southwards. Sea-level to 3500 ft. October–November.

The most widely spread of the New Zealand species. It varies much in size and degree of robustness, the size of the flower, and in the length of the filiform tails to the sepals and petals, &c. Mr. Colenso has made no less than 5 species based upon what appear to me to be exceedingly slight and inconstant differences. After a careful study of his descriptions and specimens I must confess my inability to distinguish any of them, even as varieties.

2. ***P. australis***, *Hook. f. Fl. Nov. Zel.* i. 248.—Habit of *P. Banksii* but shorter, 4–10 in. high, rarely more. Leaves shorter and broader, seldom overtopping the flower, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, linear-lanceolate, acute or acuminate. Flower small, $\frac{3}{4}$ –1 $\frac{1}{4}$ in. long, including the points of the sepals. Galea much as in *P. Banksii*, but the upper sepal and petals are not produced into filiform points. Lower lip with the free lobes narrowed into short subulate erect points not exceeding the galea in length. Lip and column as in *P. Banksii*.—*P. Banksii* var. b, *Hook. f. Handb. N.Z. Fl.* 268.

SOUTH ISLAND: In various localities from Nelson to the south of Otago, but not common. STEWART ISLAND, CHATHAM ISLANDS: Abundant, *Lyall*, *Kirk*! *H. H. Travers*, *F. A. D. Cox*! &c. November-January.

No doubt very closely allied to *P. Banksii*, and to some extent connected with it by intermediate forms. But if it be merged with that species, then for the sake of consistency *P. graminea* should also be included, for it occupies just the same position on one side of *P. Banksii* that *P. australis* does on the other. It seems preferable to treat both as distinct though closely related species.

3. *P. graminea*, *Hook. f. Fl. Nov. Zel. i. 248.*—Habit of *P. Banksii*, but smaller and much more slender, 4–10 in. high. Leaves overtopping the flower or shorter than it, 1–5 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, narrow-linear or narrow linear-lanceolate, acute or acuminate. Flower small, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, including the points of the sepals. Galea as in *P. Banksii*, but the upper sepal and petals, although acuminate, are not produced into filiform points or into very short ones. Lower lip with the free lobes narrowed into subulate or shortly filiform erect points almost equalling the galea. Lip and column as in *P. Banksii*.—*Handb. N.Z. Fl.* 268.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in shaded places in lowland districts from the North Cape southwards. September–November.

Differs from *P. Banksii* in the smaller size, narrower leaves, and smaller flower with very short tails to the sepals.

4. *P. micromega*, *Hook. f. Fl. Nov. Zel. i. 248.*—Slender, glabrous, 4–12 in. high. Lower leaves $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, ovate-oblong to linear-oblong or lanceolate, obtuse or acute, sessile or petiolate; cauline 2–5, smaller and narrower, sessile, flat, sheathing at the base, acute or acuminate. Flower large, solitary, erect, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long. Galea erect at the base, then incurved, tip horizontal or nearly so; upper sepal narrow, acuminate; petals slightly shorter, broad, falcate, acuminate. Lower lip with the entire part cuneate, the free lobes very gradually narrowed into long filiform points embracing the galea, often quite 1 in. long. Lip narrow-linear, its tip exserted; basal appendage curved, penicillate. Column about half as long as the galea, upper lobe of wing with an erect subulate tooth, lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* 268. *P. polyphylla*, *Col. in Trans. N.Z. Inst. xxii. (1890) 489.*

NORTH ISLAND: Auckland—Swamps near Lake Taupo, *Tryon*! near Tongariro, *H. Hill*! Wellington—Murimotu, *Petrie*! Karioi, *A. Hamilton*! swamps in the Wairarapa district, *Colenso*! Taranaki—Ngairi Swamp, *T. F. C.* December–January.

Best known by the slender habit, usually few radical leaves, numerous rather small flat cauline leaves, and large flower not decurved at the tip.

5. *P. Oliveri*, *Petrie in Trans. N.Z. Inst. xxvi. (1894) 270.*—Stout or slender, leafy, glabrous, 6–12 in. high. Lower leaves

few, large, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. long, $\frac{3}{4}$ –1 in. broad, oblong-ovate or elliptic-oblong to oblong-lanceolate, acute, narrowed into a short broad petiole or almost sessile, thin and membranous, veins reticulated; cauline leaves 2 or 3, almost as long but narrower, lanceolate or oblong-lanceolate, acute or acuminate, flat, spreading, sheathing at the base. Flowers large, solitary or very rarely two, 1 – $1\frac{1}{2}$ in. long. Galea bent forwards from above the base and then curved sharply downwards so that the point often reaches the ovary; upper sepal produced into a long acuminate point; petals much shorter, falcate, acuminate. Lower lip with the entire part broadly cuneate, the free lobes gradually narrowed into long filiform points embracing the galea and sometimes $1\frac{1}{2}$ in. long. Lip narrow-linear, obtuse; basal appendage short, curved, penicillate. Column slender, not half the length of the galea; wings with a short upper lobe bearing an erect subulate tooth at the outer angle, lower lobe very long, linear-oblong, obtuse.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.* Canterbury—Bealey, *Kirk!* Waimakariri Glacier, *T. F. C.* Westland—Kelly's Creek, *Petrie!* Otira Gorge, *Cockayne!* *T. F. C.* 1000–4000 ft. December–January.

Very close to *P. micromega*, but stouter, with much larger radical and cauline leaves, and with the flower very conspicuously decurved.

6. *P. foliata*, *Hook. f. Fl. Nov. Zel.* i. 249.—Rather stout, glabrous, 2–8 in. high. Lower leaves 2–5, subrosulate, sessile or petioled, 1 – $1\frac{3}{4}$ in. long, elliptic-oblong to linear-oblong, obtuse or acute, veins reticulated; cauline leaves reduced to 1 or 2 large sheathing erect lanceolate bracts $\frac{1}{2}$ –1 in. long. Flower solitary, erect, $\frac{3}{4}$ in. long. Galea erect at the base, curved forwards at the tip; upper sepal acute or acuminate; petals falcate, obtuse or subacute. Lower lip with the entire part short, broadly cuneate, the free lobes gradually narrowed into rather short filiform points embracing the galea but not much exceeding it. Lip linear-oblong, flat, obtuse; basal appendage short, curved, penicillate at the tip. Column not half the length of the galea, upper lobe of wing with a subulate tooth; lower lobe linear-oblong, obtuse.—*Handb. N.Z. Fl.* 268.

NORTH ISLAND: Ruahine Mountains and Cape Palliser, *Colenso!* Patangata, *Tryon!* SOUTH ISLAND: Marlborough, *Kirk!* Otago—*Buchanan!* Signal Hill, Millburn, Tuapeka, *Petrie!* Sea-level to 2500 ft. December–January.

Differs from *P. micromega* in the stouter habit, larger more reticulate and often decidedly rosulate radical leaves, cauline leaves reduced to sheathing bracts, smaller flowers with shorter points to the lateral sepals, and broader shorter lip.

7. *P. venosa*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 610.—Small, perfectly glabrous, 2–3 in. high. Leaves 2 or 3 near the base of the stem, large for the size of the plant, $\frac{3}{4}$ –2 in. long, broadly

oblong to oblong-ovate or elliptic-oblong, obtuse or subacute, thin and membranous, veins conspicuously reticulated; cauline leaves wanting. Scape short; flower solitary, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Galea erect at the base, sharply curved forwards towards the tip; upper sepal acute or acuminate; petals broadly falcate, acute. Lower lip broadly cuneate, the free lobes narrowed into filiform points exceeding the galea, sometimes recurved at the tips. Lip lanceolate, narrowed to a blunt point, rather thick, grooved, purplish; basal appendage penicillate at the tip. Column barely half as long as the galea, upper lobe of wing with an erect subulate point; lower lobe oblong, obtuse.—(?) *P. trifolia*, *Col. l.c.* xxxi. (1899) 281.

NORTH ISLAND: Ruahine Mountains, *Olsen*! SOUTH ISLAND: Nelson—Mount Frederic, near Westport, *Townson*! 2000–3500 ft.

So far as can be ascertained from the limited amount of material available, this is separated from *P. foliata* by the smaller size and proportionately larger leaves, the short scape, which wants the large sheathing bracts of *P. foliata*, the more sharply curved and more acute galea, and differently shaped lip.

8. *P. trullifolia*, *Hook. f. Fl. Nov. Zel.* i. 249.—Stem slender, glabrous, 2–6 in. high, seldom more. Radical leaves often wanting in flowering specimens or 1–4, in flowerless ones more numerous and subrosulate, petiolate; blade $\frac{1}{4}$ – $\frac{1}{3}$ in. long, broadly ovate or orbicular-cordate or trowel-shaped, acute or obtuse; petiole as long or longer than the blade. Cauline leaves or bracts 3–5, flat, spreading, $\frac{1}{3}$ –1 in. long, lanceolate or linear-lanceolate, acute or acuminate, the lower sometimes broader and petiolate. Flower solitary, $\frac{1}{2}$ –1 in. long. Galea erect at the base and then gradually curved forwards; upper sepal lanceolate, acuminate; petals as broad, falcate, acuminate. Lower lip broadly cuneate, the lobes long and filiform, embracing the upper sepal and exceeding it. Lip linear, glabrous, obtuse, its tip exserted; basal appendage linear, much curved, penicillate at the tip. Column less than half the length of the galea; wings with a small triangular upper lobe or tooth; lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* 269. *P. rubella*, *Col. in. Trans. N.Z. Inst.* xviii. (1886) 271.

NORTH ISLAND: Lowland districts from the North Cape to Wellington, apparently rare and local to the south of the East Cape. SOUTH ISLAND: Marlborough—Mount Peter, *J. Macmahon*!

9. *P. puberula*, *Hook. f. Fl. Nov. Zel.* i. 249.—Stem slender, puberulous, especially below, 2–4 in. high. Leaves all radical, crowded in a rosette at the base of the stem, small, shortly petiolate, $\frac{1}{5}$ – $\frac{1}{2}$ in. including the petiole, ovate or ovate-cordate, acute; bracts on the stem above the leaves 2–4, sheathing, erect, lanceolate, acuminate. Flower solitary, erect, $\frac{1}{2}$ in. long. Galea erect, shortly and abruptly incurved towards the tip, the upper sepal acute, the petals as long or rather longer, obtuse. Lateral sepals united for nearly half their length into a narrow almost quadrangular lamina,

the lobes filiform, erect, separated by a broad truncate sinus which bears a small inflexed tooth in the middle. Lip linear-oblong, obtuse, its tip barely exerted; basal appendage linear, curved, penicillate at the tip. Column about half the length of the galea, the wings with a small erect triangular upper lobe or tooth, the lower lobe linear-oblong, obtuse.—*Handb. N.Z. Fl.* 269.

NORTH ISLAND: Auckland—Clay hills from the Kaipara Harbour southwards to the Thames and Middle Waikato, not common. SOUTH ISLAND: Nelson—Vicinity of Westport, *Townson!* September–October.

A distinct little plant, well marked by the puberulous stems, small rosulate leaves, the short blunt curved tip to the galea, and comparatively short filiform points to the lateral sepals.

10. *P. barbata*, *Lindl. Swan River App.* 53.—Stem stout or slender, glabrous, 4–8 in. high. Leaves radical, crowded at the base of the stem, often rosulate, erect, sessile, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, ovate-lanceolate or lanceolate, acute or acuminate. Stem above the leaves with 2–5 large loosely sheathing erect empty bracts. Flower solitary, $\frac{3}{4}$ –1 in. long. Galea erect, incurved at the tip, oblong; upper sepal and petals both produced into short subulate points, the latter very narrow. Lower lip linear, deflexed, 2-lobed about half-way down, the lobes very narrow, acute or obtuse. Lip $\frac{1}{2}$ – $\frac{3}{4}$ in. long, filiform, terete, exerted, pendulous, fringed with long golden yellow hairs and terminated by a large capitate or irregularly lobed purple gland; appendix very short, curved, penicillate at the tip. Column slender, erect; the wings each with a long erect subulate tooth on the front angle, the lower lobe narrow, ciliate.—*Benth. Fl. Austral.* vi. 362. *P. squamata*, *Hook. f. Fl. Nov. Zel.* i. 249; *Fl. Tasm.* ii. 20, t. 116; *Handb. N.Z. Fl.* 269 (not of *R. Br.*).

NORTH ISLAND: Auckland—Exact locality not stated, *Sinclair!* near Kaitaia, *R. H. Matthews!* Lower Thames Valley, from Kopu to Puriri and Kerikeri, *Adams!* between Mercer and Miranda, *T. F. C.*; Tirau and other localities in the Upper Thames Valley, *T. F. C.* October–November.

A very remarkable little plant, at once recognised by the filiform exerted lip, plumose with bright-yellow hairs. It is a common Tasmanian plant, and is also found in South Australia, Victoria, and New South Wales.

11. *P. mutica*, *R. Br. Prodr.* 328.—Rather stout, 2–5 in. high. Leaves radical, forming a rosette at the base of the stem, sometimes withering at the flowering season, shortly petiolate, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, ovate, acute, veins reticulated. Stem with 2–5 large sheathing bracts above the leaves. Raceme 2–8-flowered; flowers small, about $\frac{1}{4}$ in. long, greenish-brown. Galea very broad, much incurved, obtuse or subacute at the tip. Lower lip small, reflexed, concave, nearly orbicular when spread out, 2-lobed almost to the middle. Lip on a very short flat claw, lamina broadly oblong, obtuse; appendage broad at the base, short and thick, entire, rounded or emarginate at the tip. Column erect; wings broad,

the lower lobe or auricle broad, obtuse.—*Hook. f. Fl. Tasm.* ii. 21, t. 117A; *Benth. Fl. Austral.* vi. 362; *Fitzgerald, Austral. Orch.* i. pt. 2; *Cheesem. in Trans. N.Z. Inst.* xv. (1883) 300. *P. tristis*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 271.

NORTH ISLAND: Hawke's Bay—Waipawa River, *H. Hill*! SOUTH ISLAND: Canterbury—Lake Lyndon and Lake Grassmere, *J. W. Enys*! Otago—Lee Stream, *Sydney Fulton*! Horse Range, Naseby, St. Bathans, Cambrian's, *Petrie*! Sea-level to 2500 ft. November–January.

An abundant Australian plant, ranging from Queensland to Tasmania.

12. *ACIANTHUS*, R. Br.

Small tender terrestrial herbs. Root of rounded tubers at the end of long fleshy fibres. Leaf solitary, sessile, cordate. Flowers few or many in a raceme, rarely solitary; bracts usually small. Upper sepal erect or curved over the column, concave, rather narrow, acute or acuminate; lateral sepals narrower, often almost filiform, erect or spreading. Petals shorter than the sepals, subulate-lanceolate. Lip equalling the petals, sessile or nearly so, undivided, base with 2 adnate calli, disc smooth or papillose. Column elongated, erect or incurved, semiterete or winged; stigma cup-shaped, placed under the rostellum. Anther terminal, erect, 2-celled; pollinia 2 or 4 in each cell, granular.

A genus comprising 7 species: 4 in Australia, 2 in New Caledonia, and 1 in New Zealand.

1. *A. Sinclairii*, *Hook. f. Fl. Nov. Zel.* i. 245.—Stems slender, sometimes almost filiform, 1–6 in. high. Leaf near the base or almost half-way up the stem, sessile, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, broadly ovate-cordate, acute or acuminate, deeply bilobed at the base, membranous, often purple beneath, veins reticulated. Flowers 2–12, shortly pedicelled, $\frac{1}{4}$ in. diam., green; bracts ovate, acute, the lowest sometimes foliaceous. Upper sepal ovate-oblong, aristate, 3-nerved; lateral sepals and petals subulate-lanceolate, acuminate. Lip horizontal or deflexed, ovate-lanceolate, concave, base with 2 large calli, tip thickened and studded with minute fleshy papillæ. Column arched over the lip, much thickened and expanded towards the tip. Pollinia 2 in each anther-cell, deeply bilobed.—*Handb. N.Z. Fl.* 264.

KERMADEC ISLANDS, NORTH ISLAND: Abundant in lowland districts throughout. SOUTH ISLAND: Marlborough—Pelorus Sound, *J. Macmahon*! Nelson—Dun Mountain, *Kirk*! near Westport, *W. Townson*! CHATHAM ISLANDS: Abundant, *F. A. D. Cox*! *Miss Seddon*! Sea-level to 2500 ft. May–August.

For an account of the fertilisation, see a paper by myself in *Trans. N.Z. Inst.* vii. 349.

13. CYRTOSTYLIS, R. Br.

Small delicate terrestrial herbs. Root of rounded tubers on long fleshy fibres. Leaf solitary, sessile, oblong to orbicular. Flowers few in a terminal raceme, often reduced to one; bracts small. Upper sepal linear or linear-lanceolate, erect or incurved, concave; lateral sepals and petals narrow-linear, spreading or deflexed. Lip horizontally spreading from the base of the column, undivided, oblong, flat, entire; base with 2 calli, produced into raised lines for some distance along the lamina. Column elongated, incurved, winged on each side towards the summit; stigma cup-shaped, placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 2 in each cell, falcate or lobed.

A genus of 2 closely allied species, one found in New Zealand, the other in Australia.

1. *C. oblonga*, Hook. f. *Fl. Nov. Zel.* i. 246.—Stems very slender, glabrous, 1–4 in. high. Leaf towards the base of the stem, sessile, spreading, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, oblong or oblong-ovate, obtuse or subacute, cordate or rounded at the base, thin and membranous, flat, obscurely 3–5-nerved. Flowers solitary or in a 2–5-flowered raceme, greenish, $\frac{1}{3}$ in. diam.; bracts small, ovate-lanceolate. Upper sepal narrow linear-obovate, erect; lateral sepals and petals narrow-linear, acute, spreading or deflexed. Lip as long as the sepals, linear-oblong, obtuse. Column slender, about $\frac{2}{3}$ the length of the upper sepal. Pollinia 2 in each anther-cell, oblong-falcate.—*Handb. N.Z. Fl.* 264.

Var. *rotundifolia*.—Altogether like the type, but the leaf is orbicular-cordate, $\frac{1}{2}$ – $1\frac{1}{2}$ in. diam.—*C. rotundifolia*, Hook. f. *Fl. Nov. Zel.* i. 246; *Handb. N.Z. Fl.* 264. *C. macrophylla*, Hook. f. *Fl. Nov. Zel.* l.c.

NORTH ISLAND: Not uncommon from the North Cape southwards. SOUTH ISLAND: Marlborough—Pelorus Sound, *J. Rutland*, *J. Macmahon*! Nelson—Buller Valley, *T. F. C.* Canterbury—Banks Peninsula, *Armstrong*; Broken River, *J. D. Enys*! *T. F. C.* Sea-level to 2500 ft. August–October.

I have been compelled to sink *C. rotundifolia* as a species. It differs in no respect except in the width of the leaf, and in several localities I have observed the two forms growing intermixed and gradually passing into each other.

14. CALOCHILUS, R. Br.

Glabrous terrestrial herbs. Root of oblong tubers. Leaves 1 or rarely 2 near the base of the stem, narrow-linear; usually there are 1 or 2 foliaceous sheathing bracts higher up. Flowers few in a terminal raceme, rather large, handsome; pedicels short; lower bract usually exceeding the ovary. Sepals almost equal, free; upper erect, broad, concave; lateral spreading. Petals smaller, broadly falcate. Lip as long or longer than the sepals, sessile, spreading or pendulous, undivided, the margins and whole surface except the narrow flexuous tip densely fringed with long hairs. Column short,

broadly winged; stigma broad, placed under the erect rostellum. Anther large, terminal, erect or incumbent, obtuse or pointed, 2-celled; pollinia granular.

A genus of 3 very closely related species, all natives of Australia, 2 of them extending to New Zealand as well.

Anther long, rostrate. Column-wing with a gland on each side near the base just within the front margin .. 1. *C. campestris*.

Anther short, obtuse. Column-wing without any gland, but 2 small erect lamellæ on each side of the base of the lip 2. *C. paludosus*.

1. *C. campestris*, *R. Br. Prodr.* 320.—Stem stout, 6–18 in. high. Leaf usually solitary, rarely 2, much shorter than the stem, narrow-linear, thick, channelled; cauline leaves or bracts 1 or 2, sheathing. Flowers 2–8, greenish-purple; pedicels $\frac{1}{2}$ –1 in. long; bracts acuminate. Upper sepal $\frac{1}{3}$ – $\frac{1}{2}$ in. long, broadly ovate, acute, concave; lateral narrower. Petals shorter, broadly oblong, falcate, veined. Lip $\frac{1}{2}$ – $\frac{3}{4}$ in. long; margins and upper surface except the slender flexuous tip covered with long reddish-purple hairs or fimbriæ, which are longest on the upper part of the lip, and shortest near the base, where they are reduced to clavate calli; usually there is a narrow strip across the very base of the lip which is smooth and bare. Column-wings dilated in front and produced into a rounded lobe on each side, on the inner face of which is a conspicuous gland. Anther long, triangular, rostrate.—*Benth. Fl. Austral.* vi. 315; *Fitzgerald, Austral. Orch.* i. pt. 4; *Kirk in Trans. N.Z. Inst.* xxiv. (1892) 427.

NORTH ISLAND: Auckland—Rotorua, *Rev. F. H. Spencer!* *Petrie!* November–December.

This doubtless has as wide a range as the following species, but so far I have seen no specimens except from Rotorua. These exactly match the plate in Fitzgerald's Australian Orchids, with the exception that the fimbriæ on the lip never show any trace of blue, but are always red.

2. *C. paludosus*, *R. Br. Prodr.* 320.—Very similar in habit and appearance to *C. campestris*, but usually (though not always) more slender, with a rather longer and narrower leaf. Flowers seldom more than 4. Sepals and petals much as in *C. campestris*. Lip longer, the surface and margins with long red fimbriæ, the linear bare tip longer, and the base with a thin longitudinal raised plate on each side. Column-wing dilated in front and produced into a rounded lobe on each side, not furnished with a gland on the inner face. Anther short, as broad as long, obtuse, neither acuminate nor rostrate.—*Benth. Fl. Austral.* vi. 316; *Fitzgerald, Austral. Orch.* i. pt. 4; *Buch. in Trans. N.Z. Inst.* xv. (1883) 240.

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews!* Aponga (near Whangarei), *A. Thompson!* Rotorua, *Petrie!* SOUTH ISLAND: Nelson—Vicinity of Collingwood, *H. H. Travers!* near Westport, *W. Townson!*

15. **LYPERANTHUS**, R. Br.

Terrestrial herbs, often black when dry. Stems rather stout. Leaves 1-3, sheathing at the base, broad or narrow. Flowers in a terminal raceme or spike, sometimes solitary; bracts large, sheathing. Upper sepal erect, incurved, broad, concave; lateral narrow, spreading or deflexed. Petals similar to the lateral sepals. Lip shorter than the sepals, with a broad erect claw sometimes dilated into small lateral lobes; lamina or middle lobe ovate or lanceolate, entire; disc with ridges or small calli. Column erect or incurved, not winged; stigma placed under the rostellum. Anther terminal, erect, 2-celled; pollinia 4, narrow, subterete, granular.

A somewhat ill-defined genus of 6 species, 4 of which are found in Australia, 1 in New Caledonia, and the remaining one in New Zealand.

1. **L. antarcticus**, *Hook. f. Fl. Antarct.* ii. 544.—Stems rather stout, 3-8 in. high. Leaves 1-3, sheathing at the base, 1-2½ in. long, the upper smaller, lanceolate or oblong-lanceolate, acute, rather coriaceous; veins numerous, parallel. Flowers 1-3, greenish, horizontal or nearly so, ⅓-½ in. long; bracts large, cucullate, sheathing, ½-¾ in. long. Upper sepal large, broad, curved over the column, hooded, acute; lateral sepals and petals linear-subulate, acute. Lip with a very short claw; lamina ovate-oblong, obtuse or subacute, margins thick, disc with 5 or 6 slender longitudinal lamellæ. Column short, stout, curved.—*Handb. N.Z. Fl.* 270.

SOUTH ISLAND: Subalpine localities from Collingwood and the Spenser Mountains southwards, but not common. STEWART ISLAND: *Kirk!* AUCKLAND ISLANDS: *Le Guillon, Bolton, Kirk!* 2500 ft. to 4000 ft., descending to sea-level in Stewart Island and the Auckland Islands. December-February.

The upper sepal is much broader and more hooded than in any other species of the genus, the sepals and petals are less spreading, and the column shorter and broader.

16. **CALADENIA**, R. Br.

Slender terrestrial herbs, usually more or less pilose or villous, rarely glabrous. Root of small rounded tubers terminating fleshy fibres. Leaf solitary from near the base of the stem, linear or lanceolate, more rarely broader and oblong-lanceolate or oblong. Flowers on an erect slender scape, solitary or in few-flowered racemes; bracts small. Upper sepal erect or incurved, narrow, concave; lateral flat, spreading, or rarely all alike and spreading. Petals narrow, erect or spreading. Lip clawed on to the base of the column, undivided or 3-lobed, the lateral lobes when present erect, the middle lobe spreading or reflexed, the margins often toothed or fimbriate, the disc usually studded with linear or clavate sessile or stipitate calli. Column rather long, erect or incurved, more or less 2-winged above; stigma broad, prominent. Anther erect, terminal, 2-celled; pollinia granular.

About 30 species are known, all confined to Australia except the three following, which are endemic in New Zealand.

Slender. Leaf solitary, linear, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad. Scape slender. Flower $\frac{1}{4}$ – $\frac{1}{3}$ in. diam. Lip 3-lobed	1. <i>C. minor</i> .
Rather stout. Leaf solitary, linear, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad. Scape stout. Flower $\frac{1}{2}$ –1 in. diam. Lip 3-lobed	2. <i>C. Lyallii</i> .
Rather stout. Leaves 2, oblong or lanceolate. Flower $\frac{3}{4}$ in. diam. Lip undivided	3. <i>C. bifolia</i> .

1. *C. minor*, Hook. f. *Fl. Nov. Zel.* i. 247, t. 56B.—Stems very slender, 3–10 in. high, rarely more, glandular-pilose with spreading hairs. Leaf from near the base of the stem and always shorter than it, 1–8 in. long, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad, very narrow-linear, flat, striate, ciliate or pilose. Flower solitary or rarely 2, pink, about $\frac{1}{3}$ in. diam. Sepals subequal, linear or linear-oblong, obtuse or subacute; upper sepal erect; lateral spreading or deflexed. Petals similar to the sepals, spreading. Lip shorter than the sepals, broad, 3-lobed; lateral lobes large, oblong, obtuse, erect, usually marked with transverse purplish bands; middle lobe lanceolate-deltoid, acuminate, reflexed, margins fringed with linear calli; disc with 2 continuous rows of bright-yellow stipitate calli. Column elongate, as long as the lip, incurved, broadly winged. Anther apiculate.—*Handb. N.Z. Fl.* 267. *C. variegata*, Col. in *Trans. N.Z. Inst.* xvii. (1885) 248.

Var. *exigua*.—Stem shorter and still more slender, almost filiform, 2–4 in. high. Sepals and petals lanceolate, acuminate. Middle lobe of lip with a single marginal gland on each side; disc with 2 rows of calli as in the type. Perhaps a distinct species.

NORTH AND SOUTH ISLANDS: From the North Cape to Otago, not uncommon. Sea-level to 2000 ft. September–December. Var. *exigua*: Kaitaia (Mongonui County), R. H. Matthews!

2. *C. Lyallii*, Hook. f. *Fl. Nov. Zel.* i. 247.—Rather stout, 4–12 in. high, pilose with long soft hairs. Leaf from near the base of the stem and much shorter than it, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, narrow-linear, rather thick, channelled, sparingly pilose on the margins and under-surface. Scape stout, with a sheathing bract about the middle, 1–2-flowered. Flower large, $\frac{1}{2}$ –1 in. diam. Upper sepal $\frac{1}{3}$ – $\frac{1}{2}$ in. long, obovate-oblong, erect or incurved, concave; lateral elliptic-oblong. Petals similar to the lateral sepals. Lip about half as long as the lateral sepals, 3-lobed; lateral lobes broad, jagged at the tip, often banded with purple; middle lobe small, recurved; disc with 4 rows of stipitate calli. Column rather long, broadly winged, incurved; anther shortly apiculate.—*Handb. N.Z. Fl.* 267.

SOUTH ISLAND, STEWART ISLAND, AUCKLAND ISLANDS.—Not uncommon in subalpine localities. Usually from 2500 ft. to 5000 ft., but descends to sea-level in the Auckland Islands. December–January.

A handsome little plant, much more robust than *C. minor*, and with much larger flowers.

3. *C. bifolia*, Hook. f. *Fl. Nov. Zel.* i. 247.—Stout or slender, glandular-pubescent, 3–9 in. high. Leaves two together towards the base of the stem, spreading, 1–2½ in. long, variable in shape, one usually much broader than the other, ovate or oblong to ovate-lanceolate or lanceolate, acute, sparingly glandular-pubescent, margins ciliate. Scape 1-flowered, with a sheathing bract a little distance below the flower. Flower white with a tinge of pink, nearly 1 in. diam. when fully expanded. Upper sepal narrow-oblong, obtuse, erect, concave; lateral spreading, linear-lanceolate. Petals shorter and narrower. Lip sessile by a narrow base, spreading, orbicular-obovate, rounded at the tip, undivided, margin entire; disc with two almost continuous lines of yellow calli extending from the middle to the base. Column elongate, incurved, 2-winged, wings not produced behind the anther.—Hook. f. *Handb. N.Z. Fl.* 267. *C. macrophylla*, Col. in *Trans. N.Z. Inst.* xxvii. (1895) 396. *Chiloglottis Traversii*, F. Muell. *Veg. Chath. Is.* 51.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Not uncommon in upland districts from Lake Taupo and Mount Egmont southwards. Ascends to 4500 ft., descends to sea-level in the extreme south and in the outlying islands. December–January.

A curious plant, the genus of which is doubtful. It was referred to *Chiloglottis* by Mueller, and certainly is allied to it in habit, but it wants the essential character of the wings of the column produced into 2 lobes behind the anther. On the whole I think it is best retained in *Caladenia*.

17. CHILOGLOTTIS, R. Br.

Terrestrial herbs, with small underground tubers. Leaves 2, radical or nearly so, oblong or linear-oblong. Scape 1-flowered, with a solitary bract below the flower. Upper sepal erect, incurved, concave, narrowed at the base; lateral narrow-linear or terete, spreading or reflexed. Petals lanceolate, falcate. Lip attached to the base of the column by a short or long claw, ovate or obovate, undivided; disc with variously arranged calli. Column elongated, incurved, winged; wings produced at the top into 2 erect lobes often equalling the anther. Stigma placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 4, granular.

A small genus of 7 species, 6 of which are natives of Australia, one of them extending to New Zealand, the remaining one confined to New Zealand. The genus differs from *Caladenia* principally in the 2-leaved stem and in the wing of the column extending behind the anther. *Caladenia bifolia* has the habit of *Chiloglottis*, but the column-wing is that of *Caladenia*, in which genus I have retained it.

Sto., upper sepal broad ovate-lanceolate; lateral sepals
at petals erect. Lip very shortly clawed, trowel-shaped 1. *C. cornuta*.
Slender. Upper sepal linear-spathulate. Petals deflexed.
Lip with a very long narrow claw, lamina rhomboid .. 2. *C. formicifera*.

1. **C. cornuta**, *Hook. f. Fl. Antarct.* i. 69.—Usually rather stout, perfectly glabrous, 2–5 in. high. Leaves 2, close together, petiolate, spreading, 1–3 in. long, $\frac{1}{2}$ –1 in. broad, oblong or linear-oblong or oblong-lanceolate, acute or subacute, flat, rather fleshy when fresh; veins parallel, connected by transverse veinlets. Scape very short at first, but lengthening as the flower withers and sometimes 4–8 in. long in fruit, 1-flowered or very rarely 2-flowered; bract sheathing. Flower about $\frac{1}{2}$ in. diam., green, sometimes spotted with purple. Upper sepal broadly ovate-lanceolate, acuminate, erect. Lateral sepals placed in front of the lip, linear-lanceolate. Petals ovate-lanceolate, acuminate, erect. Lip triangular-cordate or trowel-shaped, acute, concave; disc with 3 large stalked rounded calli near the base, 2 linear ones on each side higher up, and 3 smaller rounded ones between them. Column curved forwards, winged; the wings expanded above and produced upwards into 2 lobes exceeding the anther.—*Handb. N.Z. Fl.* 269.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, ANTIPODES ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Moist shaded places from Kaitaia and Mongonui southwards, not common. Sea-level to 3000 ft. October–December.

The calli on the labellum probably vary in number and shape, judging from Hooker's description in "*Flora Antarctica*."

2. **C. formicifera**, *Fitzgerald, Austral. Orch.* i. 3 (1877).—Slender, delicate, 2–3 in. high. Leaves 2, close together, sessile, spreading, 1–2 in. long, linear-oblong or oblong-lanceolate, obtus, thin and membranous, margins often undulate when fresh; veins parallel, connected by transverse veinlets. Scape 2–3 in. high, 1-flowered; bract near the top, sheathing. Flower about $\frac{1}{2}$ in. long. Upper sepal linear-spathulate, erect, acuminate; lateral about the same length, linear, acuminate. Petals linear-lanceolate, abruptly deflexed, about as long as the sepals. Lip horizontal or ascending, contracted below into a long and narrow claw, above suddenly expanded into a short and broad spoon-shaped or rhomboid lamina, the tip of which is usually reflexed; disc with numerous calli, the largest of which is placed at the base, and projects from it, with a kind of double head, towards the column; in front of this is a large flat heart-shaped gland, and rows of smaller calli reach the apex of the lip. Column arched forward, broadly winged.—*Cheesem. in Trans. N.Z. Inst.* xxxiii. (1901) 312.

NORTH ISLAND: Auckland—Kaitaia (Mongonui County), *R. H. Matthews* September–October.

A very remarkable little plant, previously known only from eastern Australia. Mr. Matthews's specimens agree in all respects with Mr. Fitzgerald's beautiful plate.

18. **ADENOCHILUS**, Hook. f.

Slender terrestrial herbs. Leaf solitary, placed near the middle of the stem, ovate. Peduncle slender, 1-flowered, with 1 or 2 sheathing bracts between the flower and the leaf, the upper of which sometimes bears in its axil the minute rudiment of a second flower. Flower small. Upper sepal erect, incurved, concave or almost galeate; lateral lanceolate, placed under the lip. Petals linear-lanceolate, almost equalling the sepals. Lip shortly clawed on to the base of the column, 3-lobed; lateral lobes large, erect; middle lobe smaller, caudate, reflexed; disc and middle lobe with several rows of small stalked calli. Column slender, curved, winged; wings produced upwards into 2 toothed lobes. Stigma prominent, placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 4 in each cell, granular.

The genus is limited to two species: one endemic in New Zealand, the other (*A. Nortoni*, Fitzgerald) in Australia. It is closely allied to both *Caladenia* and *Chiloglottis*, differing from the former in the wing of the column extending behind the anther, and from the latter in the solitary leaf and glandular-pubescent perianth.

1. **A. gracilis**, Hook. f. *Fl. Nov. Zel.* i. 246, t. 56A.—Stem slender, glabrous, 5–10 in. high. Leaf sessile half-way up the stem, $\frac{1}{2}$ –1 in. long, ovate or ovate-oblong, acute, membranous, veins reticulated. Flower about $\frac{1}{2}$ in. diam., more or less finely glandular-pubescent. Ovary narrow, cylindrical, $\frac{1}{2}$ – $\frac{3}{4}$ in. long. Upper sepal adnate to the back of the column towards the base, acuminate; lateral sepals and petals subsimilar, erect, acuminate. Lip much shorter than the sepals and petals and almost concealed by them; middle lobe much smaller than the lateral, caudate, reflexed; calli numerous, stipitate, yellow. Column broadly winged for its whole length, wings produced upwards behind the anther into two broad toothed lobes.—*Handb. N.Z. Fl.* 265.

NORTH ISLAND: Forests near Lake Waikaremoana, *Colenso*! SOUTH ISLAND: Nelson—Near Foxhill, *P. Lawson*! Buller Valley, *T. F. C.*; Mount Owen *Townson*! Otago—Mount Maungatua, forests to the west of Lake Te Anau, *Petrie*! near Lake Hauroto, *G. M. Thomson*! 500–2500 ft. November–January.

19. **TOWNSONIA**, n. gen.

A small slender terrestrial herb. Root of creeping fleshy caudices thickened here and there into small tubers. Radical leaves 1–3 from the caudices, rarely at the base of the flowering-stem, petiolate, ovate-orbicular. Cauline leaf or empty bract solitary half-way up the stem, sessile, ovate, acute, often much reduced in size. Flowers 1 or 2, small; perianth horizontal or deflexed. Upper sepal much incurved, broad, concave, almost galeate; lateral placed in front of the lip, lanceolate, margins involute. Petals minute, erect. Lip clawed on to the base of the

column; lamina erect, undivided, broadly ovate-rhomboid, subcordate at the base, entire, margins involute and clasping the column towards the base; disc smooth, without calli or ridges, or with an obscure thickening on each side near the base. Column rather shorter than the lip, erect, broadly and equally winged from the base; wings not continued upwards behind the anther. Stigma prominent, placed just under the small rostellum. Anther terminal, erect, 2-celled; pollinia free, granular.

A very curious little plant. It is clearly allied to *Adenochilus*, of which it has the habit, but differs in the smooth undivided lip, minute petals, and in the column-wings not being produced upwards behind the anther. The smooth undivided lip also separates it from *Chiloglottis*, *Caladenia*, *Burnettia*, and other allied genera. Believing it to form the type of a new genus, I have much pleasure in dedicating it to its discoverer, Mr. W. Townson, of Westport, to whom I am much indebted for specimens and information respecting the botany of the north-western portion of the South Island.

1. *T. deflexa*, *Cheesem.*—Very slender, 3–6 in. high. Radical leaves on slender petioles $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; blade $\frac{1}{4}$ – $\frac{1}{2}$ in., broadly oblong or orbicular-ovate, obtuse or apiculate, rounded or subcordate at the base, thin and membranous, veins reticulated. Cauline leaf ovate, acute, often very small and scale-like. Flowers small, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, greenish.

SOUTH ISLAND: Nelson—Vicinity of Westport, *Townson!* November–December.

20. CORYSANTHES, R. Br.

Dwarf very delicate succulent terrestrial herbs. Root of small rounded tubers on fleshy caudicles. Leaf solitary, ovate-cordate or orbicular or reniform. Flower solitary, large for the size of the plant, at first almost sessile on the leaf, but peduncle elongating considerably in fruit. Upper sepal large, erect and incurved, helmet-shaped; lateral free, small and linear, or long and filiform. Petals similar to the lateral sepals but smaller, sometimes wanting. Lip large, the lower portion tubular, the margins meeting behind the column and enclosing it; base with a rounded auricle on each side of the column or with a hollow conical spur; upper part truncate or expanded into a broad abruptly reflexed limb; margins entire or denticulate or fimbriate. Column short, straight, 2-winged at the top; stigma broad, placed just under the rostellum. Anther large, terminal, erect, 2-celled; pollinia 4, powdery, free.

A very curious genus of about 16 species, found in Malaya, Austria, and New Zealand, the species of each country being endemic.

A. Lip produced downwards into 2 conical spurs at the base. Lateral sepals and petals minute.

Leaf $\frac{1}{4}$ – $\frac{1}{2}$ in., sessile, ovate-cordate 1. *C. Chesemanii*.

B. Lip with 2 rounded orifices at the base. Lateral sepals and petals filiform, longer than the lip (except in C. Matthewsii).

- | | |
|--|-----------------------------|
| Leaf $\frac{1}{2}$ –1 in., sessile, ovate- or orbicular-cordate. Lateral sepals and petals about half as long as the lip. Lip truncate, entire or minutely denticulate | 2. <i>C. Matthewsii</i> . |
| Leaf $\frac{3}{4}$ –1 $\frac{1}{2}$ in., sessile, ovate-oblong, rounded or cordate at the base. Lip truncate, coarsely toothed or fimbriate.. | 3. <i>C. oblonga</i> . |
| Leaf $\frac{1}{2}$ –2 in., sessile, oblong-ovate, acuminate. Upper sepal acuminate. Lip bent forwards and downwards, acuminate.. | 4. <i>C. rivularis</i> . |
| Leaf $\frac{1}{2}$ –1 $\frac{1}{2}$ in., sessile or shortly petiolate, broadly oblong or orbicular, apiculate. Upper sepal acute. Lip abruptly reflexed and expanded, apex acute | 5. <i>C. rotundifolia</i> . |
| Leaf $\frac{1}{2}$ –2 in., petiolate, orbicular or reniform, 3-lobed at the tip. Upper sepal obtuse. Lip abruptly reflexed and expanded, apex rounded | 6. <i>C. triloba</i> . |
| Large and stout, 2–8 in. high. Leaf on a petiole $\frac{1}{2}$ –3 in. long; lamina $\frac{1}{2}$ –3 in., broadly oblong or orbicular. Upper sepal acute. Lip large, abruptly reflexed and much expanded | 7. <i>C. macrantha</i> . |

1. **C. Cheesemanii**, *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* iii. (1871) 180.—A very small species, $\frac{1}{2}$ –1 in. high when in flower, rarely more. Leaf sessile, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, ovate-cordate or orbicular-cordate, apiculate, membranous, veins conspicuous when dry. Flower sessile or shortly peduncled, about $\frac{5}{8}$ in. long, dull-purple; bract short, sheathing. Upper sepal very large, helmet-shaped, curved over the lip, obtuse. Lateral sepals minute, subulate, erect, placed between the basal spurs of the lip. Petals frequently wanting, when present very minute, deflexed, placed under or behind the basal spurs of the lip. Lip very large, tubular, the margins involute and meeting behind the column and enclosing it, the base produced downwards on each side into a short conical spur; the mouth expanded and abruptly recurved; margins entire. Column short, stout, erect, with a large fleshy gland at the base. Anther terminal, very large. Capsule $\frac{1}{3}$ in. long, linear-oblong, elevated on the greatly elongated peduncle, which is sometimes over 6 in. long.—*Id. Plant.* t. 1120.

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews!* vicinity of Auckland, *T. F. C.* SOUTH ISLAND: Near Westport, *W. Townson!* June–July.

A very curious little plant, probably not uncommon, but easily overlooked, from its small size and early flowering-period. It is very closely allied to the Australian *C. bicalcarata*, and may prove identical with it.

2. **C. Matthewsii**, *Cheesem. in Trans. N.Z. Inst.* xxxi. (1899) 351.—Small, delicate, $\frac{3}{4}$ –1 $\frac{1}{2}$ in. high. Leaf sessile, $\frac{1}{2}$ –1 in. long, ovate-cordate or orbicular-cordate, acute or obtuse, membranous when dry, showing 1 or 2 circular veins on each side of the midrib connected by transverse veinlets. Flower shortly peduncled, about $\frac{1}{3}$ in. long, horizontal or drooping, purplish-green; bract small, erect. Upper sepal very narrow at the base, broadened above and

hood-shaped, arched over the lip. Lateral sepals and petals small, linear-subulate, seldom more than $\frac{1}{2}$ as long as the lip. Lip large, involute, the margins meeting behind the column and enclosing it, orbicular-cordate when spread out; base with a rounded auricle on each side; apex truncate, entire or very slightly denticulate; disc with a thickened patch covered with deflexed hairs. Column short, stout, curved, swollen in front at the base.

NORTH ISLAND: Auckland—Kaitaia (Mongonui County), *R. H. Matthews*! July–August.

Clearly allied to *C. oblonga*, but the flower is larger, the lateral sepals and petals much reduced in size, the upper sepal narrower at the base and more hood-shaped at the top, and the margin of the lip is not coarsely fringed.

3. *C. oblonga*, *Hook. f. Handb. N.Z. Fl.* 266.—Variable in size, $\frac{1}{2}$ –2 in. high. Leaf sessile, $\frac{3}{4}$ –1 $\frac{1}{2}$ in. long, ovate-oblong, apiculate, rounded or cordate at the base, thin and membranous, conspicuously veined when dry. Flowers small, shortly peduncled, solitary or very rarely two together, about $\frac{1}{4}$ in. long, reddish-purple; bract rather large, sometimes foliaceous, erect. Upper sepal narrow, concave, oblong when spread out, obtuse or apiculate, arched over the lip. Lateral sepals and petals filiform, $\frac{1}{4}$ – $\frac{3}{4}$ in. long. Lip involute, the margins meeting behind the column and enclosing it, broadly semicordate when spread out; base with a rounded auricle or orifice on each side; apex truncate, coarsely toothed or fimbriate, centre of disc with minute dentiform papillæ. Column short, stout, curved to the front, with a swelling at the base.—*Nematoceras oblonga*, *Hook. f. Fl. Nov. Zel.* i. 250, t. 57B.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon on moist shaded banks from the North Cape southwards. Sea-level to 2000 ft. September–November.

4. *C. rivularis*, *Hook. f. Handb. N.Z. Fl.* 266.—Very delicate and membranous, 1–2 $\frac{1}{2}$ in. high. Leaf sessile, $\frac{1}{2}$ –2 in. long, ovate or oblong-ovate, acuminate, deeply cordate or almost 2-lobed at the base, very thin and membranous, veins conspicuous, reticulated. Flower shortly pedunculate or sessile between the lobes of the leaf, $\frac{1}{3}$ – $\frac{1}{2}$ in. long; bract narrow, acuminate. Upper sepal narrow, concave, arched over the lip, gradually tapering into a long filiform point. Lateral sepals and petals filiform, 1–2 in. long, the petals usually exceeding the sepals. Lip involute, the margins meeting behind the column and enclosing it, broadly ovate-cordate when spread out; base with a rounded auricle or orifice on each side; upper portion curved forwards and downwards, acuminate or apiculate, margins undulate, entire. Column very short, stout, erect.—*Nematoceras rivularis*, *Hook. f. Fl. Nov. Zel.* i. 251.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In damp wooded ravines from the North Cape southwards, but often local. Sea-level to 2000 ft. September–November.

A very remarkable and distinct species, easily recognised by the thin acuminate leaf, very long filiform petals and lateral sepals, by the filiform point to the upper sepal, and acuminate lip.

5. *C. rotundifolia*, Hook. f. *Handb. N.Z. Fl.* 266.—Variable in size, $\frac{1}{2}$ –2 in. high. Leaf sessile or shortly petiolate, $\frac{1}{2}$ –1 $\frac{1}{4}$ in. long, broadly oblong or orbicular, tip rounded and apiculate, deeply cordate or 2-lobed at the base, rather fleshy, membranous when dry, veins reticulated. Peduncle at first very short, but elongating as the flower withers. Flower $\frac{1}{2}$ in. long, dull-purple or purplish-green; bract short. Upper sepal narrow, concave, arched over the lip, acuminate. Lateral sepals and petals filiform, 1–1 $\frac{1}{2}$ in. long. Lip tubular below, the margins meeting behind the column and enclosing it, base with a rounded auricle on each side; upper part abruptly recurved and expanded, tip acute, margins very minutely denticulate. Column short, stout, bent backwards.—*C. orbiculata*, Col. in *Trans. N.Z. Inst.* xxiii. (1891) 389. *Nematoceras rotundifolia*, Hook. f. *Fl. Nov. Zel.* i. 251.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Moist wooded ravines throughout, but often local. Sea-level to 2500 ft. September–December.

This may not be the *C. rotundifolia* of the Handbook, which is described as having a truncate lip. It differs from *C. rivularis* in the more coriaceous leaf, with a rounded tip, in the upper sepal not being produced into a filiform point, and in the broader reflexed portion of the lip. From small forms of *C. macrantha* it is best distinguished by the almost sessile leaf and much smaller lip with an acute or acuminate tip. Mr. R. H. Matthews sends me specimens from Kaitaia with the leaves deeply lobed on each side, so as to be almost panduriform.

6. *C. triloba*, Hook. f. *Handb. N.Z. Fl.* 265.—Rather stout, variable in size. Leaf on a petiole $\frac{1}{2}$ –2 in. long; blade $\frac{1}{2}$ –1 $\frac{1}{2}$ in. diam., reniform or orbicular, more or less distinctly 3-lobed at the tip, middle lobe acute, cordate at the base, fleshy when fresh, membranous when dry. Peduncle at first short, but elongating as the flower withers, and in fruit often 4–8 in. long. Flower $\frac{1}{3}$ – $\frac{1}{2}$ in. long, dull-purple; bract rather small. Upper sepal narrow at the base, dilated above, obovate-spathulate when spread out, arched over the lip, concave, obtuse at the tip. Lateral sepals and petals filiform, erect, $\frac{3}{4}$ –2 in. long. Lip involute, tubular below, the margins meeting behind the column and enclosing it, and with a rounded auricle or orifice at the base on each side; upper part abruptly reflexed and much expanded laterally and downwards, forming a broad saucer-like entrance to the flower; margins erose or nearly entire. Column short, stout, bent backwards.—*C. hypogæa*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 336. *Nematoceras triloba*, Hook. f. *Fl. Nov. Zel.* i. 250.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Shaded places from the North Cape southwards, but often local. Sea-level to 2000 ft. July–September.

7. *C. macrantha*, Hook. f. *Handb. N.Z. Fl.* 266.—Much larger than the other species, 2–8 in. high or more. Leaf on a petiole $\frac{1}{2}$ –3 in. long; lamina $\frac{3}{4}$ –2 in. diam., broadly oblong or orbicular, obtuse or apiculate or rarely 3-lobed at the tip, cordate or 2-lobed at the base, thick and fleshy when fresh, thin and membranous when dry, veins finely reticulate. Peduncle from the base of the petiole, at first short, but elongating as the flower withers, often 4–10 in. long in fruit. Flower large, $\frac{1}{2}$ –1 in. long, dark-purple; bract small. Upper sepal narrow, concave, arched over the lip, somewhat expanded above, acute or acuminate. Lateral sepals and petals filiform, 1–2 in. long. Lip large, tubular below, the margins meeting behind the column and enclosing it, base with a rounded auricle on each side, upper part abruptly recurved and much expanded all round, margins undulate, minutely erose or denticulate. Column short, stout, bent backwards.—*C. papillosa*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 337. *Nematoceras macrantha*, Hook. f. *Fl. Nov. Zel.* i. 229, t. 57A.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS: Not uncommon in damp shaded places throughout. Sea-level to 2500 ft. October–December.

Closely allied to *C. triloba*, but much larger, the leaves rarely 3-lobed at the tip, the upper sepal acute or acuminate, and the lip larger. Both it and *C. triloba* frequently have the peduncle bent backwards, so that the flower lies with the upper sepal undermost and the lip above.

21. *GASTRODIA*, R. Br.

Leafless terrestrial brownish herbs. Root long, tuberous, usually parasitic on the roots of other plants. Stem simple, erect, furnished with lax sheathing scales. Flowers in a terminal raceme. Sepals and petals connate into a ventricose 5-lobed tube more or less slit on the anterior side. Lip shorter than the perianth, attached at the base to the foot of the column, and adnate at the back to the perianth-tube; lamina erect, furnished with longitudinal raised lines or naked, margins undulate. Column long or short, narrowly 2-winged; rostellum small; stigma near the base of the column, prominent. Anther lid-like, incumbent; pollinia free, granular.

A small genus of 8 or 9 species, ranging from New Zealand and Australia northwards to Malaya, the Himalayas, China, and Japan.

- | | |
|---|-----------------------------|
| Raceme 2–8 in., many-flowered. Perianth $\frac{3}{4}$ in. Column elongated, $\frac{2}{3}$ the length of the lip | 1. <i>G. sesamoides</i> . |
| Raceme 6–12 in., very many flowered. Perianth $\frac{1}{2}$ in. Column very short, barely $\frac{1}{4}$ the length of the lip | 2. <i>G. Cunninghamii</i> . |
| Stem slender, almost filiform. Raceme 1–3 in., 3–5-flowered. Perianth $\frac{1}{2}$ in. Column very short, barely $\frac{1}{2}$ the length of the lip | 3. <i>G. minor</i> . |

G. Hectori, Buch. in Trans. N.Z. Inst. xix. (1887) 214, is shown by the specimens in Mr. Buchanan's herbarium to be a *Prasophyllum*, probably *P. patens*, R. Br.

1. *G. sesamoides*, R. Br. *Prodr.* 330. — Root very long and tuberous. Stem stout or slender, 1–2½ ft. high, mottled grey; sheathing scales loose, truncate or with an obtuse point. Raceme 2–8 in. long, many-flowered; bracts scarious, broadly ovate, shorter than the pedicels. Flowers brownish-white, about $\frac{2}{3}$ in. long without the ovary, drooping. Perianth ventricose, gibbous at the base, shortly 5-lobed; lobes short and broad, ovate, constricted at the base. Lip slightly shorter than the perianth; lamina oblong, with 2 thick ridges up the median line, which coalesce into one near the tip, margins much crisped and undulate. Column elongate, almost as long as the lip, angular, narrowly winged above; stigma a large protuberance at the very base.—*Hook f. Fl. Tasm.* ii. 31, t. 126; *Benth. Fl. Austral.* vi. 309; *Fitzgerald, Austral. Orch.* ii. pt. 5; *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 272.

NORTH ISLAND: Auckland—Kaitaia, R. H. Matthews! Northern Wairoa, T. F. C.; Great Barrier Island, Kirk! near Auckland, T. F. C.; East Cape district, Adams and Petrie! SOUTH ISLAND: Westland—Kelly's Creek, Petrie! Sea-level to 1500 ft. December–January.

The long slender column at once separates this from the following species, which it otherwise much resembles. In Australia it ranges from Queensland to Tasmania.

2. *G. Cunninghamii*, Hook. f. *Fl. Nov. Zel.* i. 251.—Habit and appearance of *G. sesamoides* but usually smaller and more slender, 1–3 ft. high or even more. Stem brownish, often striped and spotted with purple or fawn colour. Raceme 6–10 in. long, very many-flowered, pedicels slender, $\frac{1}{5}$ – $\frac{1}{3}$ in.; bracts ovate, acute, scarious. Flowers brownish-white, $\frac{1}{2}$ in. long without the ovary, drooping. Perianth tubular, much swollen at the base, split half-way down on the anterior face, shortly 5-lobed; lobes broad, ovate-deltoid, acute. Lip rather shorter than the perianth; lamina narrow trowel-shaped with 2 papillose ridges running up the middle and uniting near the tip; margins involute, membranous, much crisped and undulate. Column very short, barely $\frac{1}{4}$ the length of the lip.—*Handb. N.Z. Fl.* 263; *Petrie in Trans. N.Z. Inst.* xxv. (1893) t. 20, f. 1–4. *G. leucopetala*, Col. in *Trans. N.Z. Inst.* xviii. (1886) 268.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Not uncommon in dark shaded places, but easily overlooked. Sea-level to 2000 ft. *Perei*; *Makaiika*. November–January.

The starchy thick and tuberous root was formerly collected by the Maoris and eaten, especially in the Urewera district.

3. *G. minor*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 273, t. 20, f. 5–7.—Stem umber-brown, not spotted, very slender, 8–15 in.

high, $\frac{1}{2}$ in. diam. at the base; sheathing scales few, oblique. Raceme 1-3 in. long, 3-5-flowered; pedicels slender, $\frac{1}{2}$ in. long; bracts short, broad, scarious. Flowers brownish tipped with dirty-white, $\frac{1}{2}$ in. long without the ovary, drooping. Perianth ventricose, gibbous at the base, split about half-way down on the anterior side, shortly 5-lobed; lobes rounded-ovate, undulate. Lip hardly shorter than the perianth; lamina linear-oblong, obtuse, with 2 thick median ridges; margins incurved, thickened, slightly crumpled. Column very short, barely $\frac{1}{4}$ the length of the lip.

SOUTH ISLAND: Otago—Ophi Creek, near Dunedin, *Petrie!* January.

Dried specimens differ very little in appearance from slender forms of *G. Cunninghamii*; but according to Mr. Petrie there are important differences in the lip and column.

ORDER LXXX. IRIDEÆ.

Perennial herbs, with a tuberous or bulbous or creeping rhizome. Leaves usually all radical, narrow, equitant and distichous. Flowers hermaphrodite, regular or obliquely irregular, solitary and terminal, or in spikes or corymbs or panicles, or clustered, enclosed within 2 spathaceous usually scarious bracts. Perianth superior, petaloid, marcescent; segments 6, in 2 series, imbricate. Stamens 3, epigynous or inserted on the outer perianth-segments; filaments free or united into a tube; anthers 2-celled, opening outwards. Ovary inferior, 3-celled; style filiform, usually 3-fid above; divisions stigmatic at the end, subulate or narrow or broad, sometimes petaloid; ovules numerous, in the inner angle of each cell, anatropous. Fruit a coriaceous 3-celled usually trigonous capsule, loculicidally 3-valved. Seeds usually numerous, albuminous; embryo short, cylindric.

A large order, comprising nearly 60 genera and about 700 species, dispersed over the whole world, but most abundant and varied in South Africa, plentiful in South Europe, not infrequent in America, comparatively rare in Asia. The order includes few useful species. Some are said to be purgative and diuretic, and the dried stigmas of the saffron (*Crocus sativus*) are a well-known dye. Many of the species are cultivated in gardens on account of the beauty of their flowers, especially of the genera *Iris*, *Crocus*, *Ixia*, and *Gladiolus*. The single New Zealand genus extends to Australia on the one side, and South America on the other.

1. LIBERTIA, Spreng.

Perennial herbs with a short creeping rhizome and long fibrous roots. Leaves numerous, densely crowded at the base of the stem, distichously imbricate, equitant, linear or ensiform, flat, rigid. Flowering-stems erect, simple or branched; cauline leaves few. Flowers on slender pedicels, clustered in the axils of sheathing bracts, forming a corymbose-paniculate or subumbellate inflorescence. Perianth regular, tube wanting; segments 6, spreading, free to the base, the 3 inner rather longer and broader.

Stamens 3; filaments free or slightly connate at the base; anthers linear-sagittate, versatile. Ovary 3-celled; ovules many in each cell; style short, with 3 linear-subulate spreading branches. Capsule broadly oblong or obovoid or globose, 3-valved. Seeds angled or compressed, smooth or foveolate.

A small genus of 8 or 10 species, found in New Zealand, Australia, and extratropical South America. One of the New Zealand species extends to Australia and Tasmania, the remaining two are endemic.

Leaves $\frac{1}{3}$ – $\frac{1}{2}$ in. broad. Flower-clusters many, paniced.

Capsule $\frac{1}{3}$ – $\frac{1}{2}$ in. long 1. *L. ixioides*.

Leaves $\frac{1}{3}$ – $\frac{1}{2}$ in. Flower-clusters many, paniced. Cap-
sule $\frac{1}{2}$ – $\frac{3}{4}$ in. long 2. *L. grandiflora*.

Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in. Flower-clusters solitary or rarely 2–3.
Capsule globose, $\frac{1}{2}$ in. diam. 3. *L. pulchella*.

1. ***L. ixioides***, *Spreng. Syst. i.* 168.—Rhizome very short. Leaves numerous, densely tufted. 1–2 ft. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, narrow-linear, acuminate, rigid and coriaceous, striate; margins cartilaginous, smooth or very obscurely and minutely scabrid. Flowering-stem longer or shorter than the leaves, usually with 1 or 2 cauline leaves below the inflorescence. Panicle broad; branches alternate from the axils of membranous sheathing bracts, bearing subumbellate clusters of 2–10 rather large white flowers on long pedicels. Perianth variable in size, $\frac{1}{2}$ –1 in. diam.; the 3 outer segments oblong or elliptic, often greenish on the outside; the 3 inner larger and broader, broadly oblong or orbicular, pure white. Capsule broadly oblong or obovoid, $\frac{1}{3}$ – $\frac{1}{2}$ in. long.—*A. Cunn. Precur. n.* 307; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel. i.* 252; *Handb. N.Z. Fl.* 274. *L. restioides*, *Klatt in Linnæa*, xxxi. (1861–62) 383. *L. orbicularis*, *Col. in Trans. N.Z. Inst. xv.* (1883) 329. *Sisyrinchium ixioides*, *Forst. Prodr. n.* 325; *A. Rich. Fl. Nouv. Zel.* 161. *Moræa ixioides*, *Thunb. Diss. Moræa*, 8. *Ferraria ixioides*, *Willd. Sp. Plant. iii.* 582. *Renealmia ixioides*, *Ker-Gawl. Gen. Irid.* 27. *Nematostigma ixioides*, *A. Dietr. Sp. Plant. ii.* 510.

Var. *a*.—Bracts all lanceolate.

Var. *b*.—Upper bracts ovate, acute.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant from the North Cape southwards. Sea-level to 2000 ft. *Tukauki*. October–December.

A very variable plant. Var. *b* appears to be rare in the North Island.

2. ***L. grandiflora***, *Sweet Hort. Brit. ed. ii.* 498.—Habit of *L. ixioides*, but taller and stouter, 2–3 ft. high, with leaves $\frac{1}{3}$ – $\frac{1}{2}$ in. broad. Flowering-stem and bracts much as in *L. ixioides*. Flowers rather larger, the inner perianth-segments much larger and broader than the outer, often 3 or 4 times as large. Capsule much larger,

$\frac{1}{2}$ – $\frac{3}{4}$ in. long, broadly oblong or obovoid, yellow when fully ripe.—*Handb. N.Z. Fl.* 274. *L. macrocarpa*, *Klatt in Linnæa*, xxxi. (1861–62) 384. *Renealmia grandiflora*, *R. Br. Prodr. Add.* 592.

NORTH AND SOUTH ISLANDS: From the North Cape to Otago, but not so common as *L. ixioides*. October–November.

But for the great difference in the size of the capsule this might very well have been regarded as a variety of *L. ixioides*.

3. *L. pulchella*, *Spreng. Syst.* i. 168.—Small, slender, 3–9 in. high. Rhizome often elongated, sometimes branched at the top. Leaves 2–6 in. long, $\frac{1}{2}$ – $\frac{1}{6}$ in. broad, grassy, hardly rigid, margins smooth or ciliolate. Scape usually longer than the leaves, bearing a single terminal subumbellate cluster of 3–8 small white flowers, or in large specimens 1 or 2 other clusters may be developed lower down the scape; pedicels very slender, pubescent, $\frac{3}{4}$ –1 in. long; bracts numerous, whorled at the base of the clusters. Perianth $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; segments almost equal, oblong-obovate. Capsule $\frac{1}{6}$ – $\frac{1}{5}$ in. diam., globose, membranous.—*Benth. Fl. Austral.* vi. 413. *L. micrantha*, *A. Cunn. Precur.* n. 308; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 252; *Handb. N.Z. Fl.* 274.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Damp mossy places in hilly forests throughout, not uncommon. Sea-level to 4000 ft. November–January. Also in south-eastern Australia and Tasmania.

ORDER LXXXI. AMARYLLIDEÆ.

Usually perennial herbs, sometimes of large size. Rootstock bulbous, tuberous, tufted or creeping. Leaves generally all radical, narrow, not usually equitant or distichous. Flowers regular or slightly irregular, hermaphrodite, in terminal umbels or racemes or panicles, rarely solitary; peduncles or scapes naked or bracteate. Perianth superior, petaloid, tube long or short, limb 6-lobed or -partite, sometimes bearing at the throat a petaloid corona (*Narcissus*, &c.). Stamens 6, inserted on the perianth-tube or at the base of the segments and opposite to them; filaments free or united at the base; anthers 2-celled, versatile, introrse. Ovary inferior, 3-celled; style filiform or columnar, stigma simple or 3-fid; ovules numerous, in 2 series in the inner angle of each cell, anatropous. Fruit usually a 3-celled capsule with loculicidal dehiscence, rarely an indehiscent berry. Seeds generally numerous, sometimes reduced to 1 or 2 in each cell; albumen fleshy; embryo small, axile.

A well-known and widely distributed order, found in all warm and temperate countries, but (like the preceding family) decidedly rare in Asia. Genera 65; species under 700. It includes the American aloe (*Agave americana*), which can be applied to a wonderful variety of uses. Both it and other species of *Agave* are valuable fibre-plants, *A. rigida* being the well-known sisal hemp.

The ornamental species are very numerous, the principal genera being *Narcissus*, *Galanthus* (snowdrop), *Leucoium* (snowflake), *Hippeastrum*, *Amaryllis*, *Vallota*, *Crinum*, *Alstr meria*, *Agave*, *Fourcroya*. The single genus found in New Zealand is widely diffused.

1. HYPOXIS, Linn.

Small herbs. Rhizome bulbous or tuberous, coated with a membranous or fibrous sheath. Leaves radical, narrow, flat or terete, often hairy. Scape 1- or many-flowered. Perianth regular, tube wanting; segments 6, nearly equal, spreading. Stamens 6, inserted on the base of the segments and shorter than them; anthers erect, linear or oblong, dorsifixed. Ovary inferior, 3-celled; ovules numerous in each cell, 2-seriate; style short, columnar; stigmas 3, stout, erect, distinct or connate. Capsule globose or oblong, membranous, 3-valved or circumscissile below the top. Seeds small, subglobose; testa crustaceous, shining, usually more or less beaked at the hilum.

Species over 50, mainly confined to southern or tropical Africa, a few only in Asia, Australasia, or America.

1. *H. pusilla*, Hook. f. *Fl. Tasm.* ii. 36, t. 130B.—Very small, 1–2 in. high. Rhizome globose, bulb-like, clothed with the setose remains of the old leaves, $\frac{1}{3}$ in. diam. Leaves 3–6, $\frac{1}{2}$ –2 in. long, filiform, wiry, flexuous, grooved down the inner face, base widened into a scarious sheath. Scapes shorter than the leaves, 1–3-flowered. Flowers small, $\frac{1}{8}$ in. diam. Perianth-segments ovate-lanceolate, acute. Stamens short, not half as long as the perianth-segments; anthers linear, basifixed. Stigmas lanceolate, free. Capsule globose, $\frac{1}{8}$ in. diam.—Hook. f. *Handb. N.Z. Fl.* 275; Benth. *Fl. Austral.* vi. 449. *H. hygrometrica*, Hook. f. *Fl. Nov. Zel.* i. 253 (not of R. Br.).

NORTH ISLAND: Hawke's Bay, Colenso. SOUTH ISLAND: Marlborough—Sandy ground near the mouth of the Wairau River, J. Macmahon! Canterbury—Banks Peninsula, Travers, Armstrong! Cockayne! Canterbury Plains, Armstrong! November–April.

Probably not uncommon on the eastern side of the South Island, but very easily overlooked. Also a native of Victoria and Tasmania.

ORDER LXXXII. LILIACEÆ.

Perennial herbs, rarely shrubs or trees. Root fibrous, or rhizome tuberous or bulbous or creeping. Stem herbaceous or woody, erect or climbing, tall or scarcely produced beyond the radical leaves. Leaves usually in radical tufts, or crowded at the ends of the stems or branches, or scattered along the branches, very various in size, shape, and texture. Flowers usually regular, hermaphrodite or rarely unisexual, inflorescence very various. Perianth inferior, petaloid; tube long or short; limb 6-lobed or -par-

tite; segments in 2 series, imbricate or rarely valvate. Stamens 6, rarely 3, inserted towards the base of the perianth-segments and opposite to them, rarely hypogynous; filaments free or connate at the base; anthers oblong or linear, 2-celled, versatile. Ovary superior, 3-celled (sometimes imperfectly so in *Astelia*); style usually simple with a small terminal stigma, or more or less deeply divided into 3 stigmatic branches; ovules few or many in each cell, attached to the inner angle, usually anatropous. Fruit a 3-celled (rarely 1-celled) capsule or berry. Seeds 1 or more in each cell, globose or angular or flattened; testa frequently black, crustaceous or membranous; albumen copious, fleshy or horny; embryo small, terete.

A very large and important order, found all over the world, but more abundant in temperate and subtropical regions than in the tropics. It is frequently divided into 3 or 4 separate orders, but in a small Flora it seems advisable to avoid extreme subdivision. Genera estimated at 190, species about 2500. The order has many useful species. The onion, leek, garlic, and asparagus are well-known edible plants. Aloes, squills, and sarsaparilla are important medicines. *Phormium* produces one of the strongest of vegetable fibres. Some are dangerous poisons, as white hellebore and meadow-saffron. Among the multitude of showy garden-plants it will be sufficient to mention the lily, tulip, hyacinth, asphodel, lily of the valley. Of the 10 genera found in New Zealand, *Phormium* extends to Norfolk Island; *Rhipogonum*, *Herpolirion*, and *Arthropodium* occur in Australia, the latter in New Caledonia as well; *Enargea* in Chili and the Falkland Islands; *Astelia* in Australia, the Pacific islands, and temperate South America; *Bulbinella* in South Africa; the remaining three (*Cordyline*, *Dianella*, and *Iphigenia*) are widely distributed.

A. Fruit a berry.

* Leaves with distant parallel primary veins connected by transverse veinlets.

Tall branching climber. Leaves usually opposite. Flowers racemose or paniculate	1. RHIPOGONUM.
Stems short, wiry, creeping. Leaves alternate. Flowers solitary or 2-3, axillary	2. ENARGEA.

** Veins of leaves not connected by transverse veinlets.

Stems woody, usually arborescent. Leaves crowded at the ends of the stem or branches, glabrous. Flowers hermaphrodite; perianth deciduous	3. CORDYLINE.
Large tufted herbs. Leaves all radical, more or less clothed with silky hairs. Flowers dioecious; perianth persistent	4. ASTELIA.
Tufted herbs. Leaves all radical, glabrous. Flowers hermaphrodite; filaments thickened upwards	5. DIANELLA.

B. Fruit a capsule.

Leaves long, narrow, coriaceous. Scape tall, branched above. Perianth tubular, curved	6. PHORMIUM.
Leaves, linear, fleshy. Scape stout, naked. Flowers racemose, yellow; filaments naked	7. BULBINELLA.
Scape stout, with leafy bracts. Flowers paniced, white; pedicels jointed in the middle. Filaments bearded	8. ARTHROPODIUM.

- Small alpine herb. Rhizome creeping. Leaves distichous. Flowers large, solitary, sessile. Style filiform. 9. HERPOLIRION.
 Small herbs. Rootstock a tunicate corm. Leaves few.
 Flower small. Styles 3. 10. IPHIGENIA.

1. RHIPOGONUM, Forst.

Tall climbing shrubs, much branched above. Leaves opposite or nearly so, 3-5-nerved with transverse reticulated veins between; petioles without tendrils. Flowers hermaphrodite, small, shortly pedicelled, racemose; racemes axillary or terminal, simple or compound, sometimes forming a terminal panicle. Perianth deciduous; segments 6, all equal or the outer ones shorter. Stamens 6, hypogynous; filaments very short, flattened; anthers erect, longer or shorter than the perianth. Ovary superior, sessile, 3-celled; style short, stout; stigmas 3, thick, recurved; ovules solitary or geminate in each cell. Fruit a globose berry, usually 1-seeded by abortion, rarely 2-3-seeded. Seeds globose; testa thin, appressed; embryo small, remote from the hilum.

In addition to the single species found in New Zealand, there are four others in Australia.

1. *R. scandens*, Forst. *Char. Gen.* 50.—A tall glabrous climber. Stems slender, knotted at the joints, often forming interwoven masses difficult to penetrate. Leaves opposite or very rarely alternate, petiolate, 3-5 in. long, narrow ovate-oblong to oblong-lanceolate, acute or acuminate, coriaceous, 3- or 5-nerved, the intermediate veinlets copiously reticulated. Racemes axillary, simple or branched, 3-6 in. long, the upper ones sometimes forming a terminal panicle. Flowers small, greenish, about $\frac{1}{2}$ in. diam.; pedicels slender, spreading. Perianth-segments very small, oblong-lanceolate, acute. Stamens 6, much longer than the perianth; filaments short, thick; anthers very large, linear-lanceolate. Ovary ovoid-globose; ovules geminate in each cell; style short, thick; stigma large, obsoletely 3-lobed. Berry globose, $\frac{1}{2}$ in. diam., bright-red.—*A. Rich. Fl. Nouv. Zel.* i. 151; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 253; *Handb. N.Z. Fl.* 281; *Benth. in Hook. Ic. Plant.* t. 1395. *R. parviflorum*, *R. Br. Prodr.* 293; *A. Cunn. Precur.* n. 305. *Similax Ripogonum*, *Forst. Prodr.* n. 372.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Lowland forests from the North Cape southwards, abundant. Sea-level to 2000 ft. *Supplejack*; *Kareao*; *Pirita*. November-December.

A familiar plant to all bushmen, especially in the northern part of the colony. In the South Island it is mainly found near the coasts. The long, tough, and elastic stems have been used for baskets, hurdles, &c.; and an extract from the root has been employed in the place of sarsaparilla.

2. **ENARGEÆ**, Banks and Sol.

Glabrous almost suffruticose herbs. Stems slender, branched, wiry, knotted at the joints, lower joints with small membranous scales. Leaves alternate, sessile or nearly so, distichous, lanceolate to oblong, prominently nerved. Flowers white, solitary or 2-4 in the axils of the leaves. Perianth deciduous; segments 6, distinct, subequal, spreading, thin, nerveless. Stamens 6, hypogynous; filaments erect; anthers linear-oblong, basifixed, longitudinally dehiscent. Ovary sessile, ovoid, 3-celled; ovules 4-10 in each cell; style filiform; stigma terminal, capitate or obsoletely 3-lobed. Berry subglobose, indehiscent. Seeds few, ovoid or subglobose; testa thin, appressed; embryo short, straight; albumen horny.

In addition to the New Zealand species, which appears to be the same as the Fuegian and Falkland Island *E. marginata*, there are two others from Chili. I agree with the late Baron Mueller ("Victorian Naturalist," December, 1886) in considering that *Enargea* should take precedence over both *Callixene* and *Luzuriaga*. *Enargea* was published by Gaertner from Solander's notes in 1788, whereas *Callixene* did not appear until 1789, and *Luzuriaga* in 1802. *Enargea* appears to have been rejected on account of an error in Gaertner's plate, but that does not seem to be a sufficient reason for setting aside the name.

1. ***E. marginata***, Banks and Sol. ex Gaertn. *Fruct.* i. 283, t. 59.

—Stems slender, branched, wiry, flexuous, creeping at the base, 4-12 in. long or more. Leaves alternate, sessile or very shortly petiolate, $\frac{1}{2}$ -1 $\frac{1}{4}$ in. long, linear-oblong to oblong, mucronate, pale-green, rather rigid, coriaceous, longitudinally 5-7-nerved, transverse veinlets few. Flowers solitary, terminal or in the upper axils, white, $\frac{1}{3}$ - $\frac{3}{4}$ in. diam.; pedicels short, slender, erect. Perianth-segments subequal, ovate-lanceolate, acute. Stamens not half the length of the segments; filaments glabrous. Berry globose, $\frac{1}{3}$ in. diam.—*Callixene marginata*, Lam. *Illust.* t. 248. *C. parviflora*, Hook. f. in Hook. *Ic. Plant.* t. 632; *Fl. Nov. Zel.* i. 254; *Handb. N.Z. Fl.* 281. *C. melalantha*, Col. in *Trans. N.Z. Inst.* xvii. (1885) 250. *Luzuriaga parviflora*, Kunth *Enum. Pl.* v. 281.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Mountain-forests from Cape Colville and the Thames goldfields southwards, not uncommon. Sea-level to 3500 ft. *Puwatawata*. November-February.

The New Zealand plant is said to differ from the South American mainly in the smaller flowers. This, however, is a variable character, and I have accordingly followed the "Genera Plantarum" in uniting the two species.

3. **CORDYLINE**, Comm.

Trees or shrubs; trunk long or short, sometimes almost wanting. Leaves crowded at the top of the stem or its branches, more rarely alternate along the stem, sessile or petioled, very long, coriaceous; veins parallel, more or less oblique to the midrib. Flowers hermaphrodite, in terminal much-branched panicles, solitary or

fascicled along the branches, shortly pedicellate or almost sessile. Perianth narrow-campanulate or cylindric, 6-partite; segments narrow, all equal or the 3 inner rather longer. Stamens 6, inserted at the base of the segments, shorter or longer than them; filaments filiform or flattened; anthers narrow-oblong, dorsifixed. Ovary 3-celled; style filiform; stigma capitate or shortly 3-lobed; ovules numerous (4-16) in each cell. Berry globose, 3-celled, at first more or less succulent, but often dry when the seeds are fully ripe. Seeds few or many in each cell, sometimes solitary by abortion, usually curved; testa black, shining.

About 10 or 12 species are known, scattered through India, Malaya, Polynesia, and New Zealand, together with one species in South America. With the exception of the wide-ranging *C. terminalis*, all the species found in New Zealand are endemic.

A. Leaves contracted into a long and narrow canaliculate petiole.

- Leaves 1-2½ ft., broadly oblanceolate or narrow-oblong; lateral veins fine. Panicle 1-2 ft.; branches simple, spreading. Flowers lilac 1. *C. terminalis*.
 Leaves 3-6 ft., linear-lanceolate; lateral veins strong, prominent. Panicle 2-5 ft., much branched. Flowers white 2. *C. Banksii*.

B. Leaves sessile, ensiform, not contracted into a conspicuous petiole.

- Stem 15-40 ft. Leaves 1½-3 ft. × 1½-2½ in., rather thin; lateral veins fine, green 3. *C. australis*.
 Stem 5-20 ft. Leaves 2-6 ft. × 4-6 in., excessively thick and coriaceous; lateral veins coarse, conspicuous, red or yellow 4. *C. indivisa*.
 Stem wanting or very short. Leaves 1-3 ft. × ¼-¾ in., narrow-linear 5. *C. pumilio*.

1. *C. terminalis*, Kunth in *Abh. Acad. Berl.* (1820) 30.—Stem slender, 3-8 ft. high. Leaves numerous, crowded, 1-2½ ft. long, 2-5 in. broad, broadly oblanceolate or almost oblong, acute or acuminate, gradually narrowed into a long petiole, thinly coriaceous, pale-green, midrib distinct beneath but obscure above; lateral veins numerous, fine, distinct, oblique; petiole 2-6 in. long, deeply canaliculated above, obtusely keeled beneath, dilated and sheathing at the base. Panicle 1-2 ft. long, broad, laxly branched; branches spreading, the lower ones again divided. Flowers solitary or 2-3 together along the branches of the panicle, sessile or very shortly pedicelled, ⅓ in. long, lilac; bracteoles 3, small, deltoid. Perianth-segments equal, longer than the tube. Stamens not exceeding the segments. Berry globose, ⅓ in. diam.—*Benth. Fl. Austral.* vii. 21; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 174. *C. Cheesemanii*, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 508.

KERMADEC ISLANDS: Lower portions of Sunday Island, not common, *T. F. C.* NORTH ISLAND: Formerly cultivated by the Maoris in the Bay of Islands and other northern districts, now nearly extinct. *Ti-pore*. July-September.

A most abundant plant throughout Polynesia, and stretching northwards through Queensland and New Guinea to Malaya and India. I have examined the specimens, cultivated in Mr. Reid's garden at Ahipara, upon which Mr. Kirk founded his *C. Cheesemanii*. They differ in no respect from the common Polynesian form of *C. terminalis*, and as they were found in an abandoned Maori cultivation they can only be looked upon as survivors from a period when the species was grown by the Maoris for food-purposes. Archdeacon Walsh (Trans. N.Z. Inst. xxxiii. 301) mentions other instances of *C. terminalis* having been found in old Maori cultivations, and argues with much probability that the plant was originally introduced by the Maoris on their first colonisation of New Zealand.

2. *C. Banksii*, Hook. f. in *Gard. Chron.* (1860) 792.—Stems slender, simple or sparingly branched, or several from the base forming large clumps, 4–10 ft. high. Leaves numerous, very long, erect below, drooping towards the tips, 3–6 ft. or even more, $1\frac{1}{2}$ – $3\frac{1}{2}$ in. broad at the middle, linear-lanceolate, acuminate, gradually contracted into a petiole 1–2 ft. long, striate and obliquely many-nerved, 4–8 of the nerves on each side of the midrib stronger than the rest and either green or red or yellowish; midrib stout, flat above, prominent and rounded beneath; petiole deeply channelled above, rounded beneath. Panicles one or several to each stem, suberect or drooping, very large and lax, much and diffusely branched, 2–5 ft. long. Flowers longer and narrower than in *C. australis*, and not so closely placed, nearly $\frac{1}{2}$ in. long, white, sessile or nearly so; bracteoles very small. Berry globose, $\frac{1}{3}$ in. diam., white. Seeds 2–3 in each cell.—*Handb. N.Z. Fl.* 282; *Regel in Gartenfl.* t. 344. *C. Beuckelaerii*, *C. Koch*, *Wochenschr. vici.* (1865) 91. *C. erythrorhachis*, *Hort. ex Baker in Journ. Linn. Soc. xiv.* (1875) 541. *C. diffusa*, *Col. in Trans. N.Z. Inst. xv.* (1883) 330.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape to Marlborough, Nelson, and Westland. Sea-level to 3500 ft. *Ti-ngahere*. November–December.

A very distinct species, easily recognised by the large many-nerved leaves gradually narrowed into long slender petioles, large lax panicles, and long narrow flowers.

3. *C. australis*, Hook. f. in *Gard. Chron.* (1860) 792.—Variable in size and habit. Stems of young trees straight, erect, unbranched; of mature ones much branched above or more rarely from the base, 15–40 ft. high; trunk 1–5 ft. diam.; bark thick, rough and fissured. Leaves of young plants scattered along the stem, 1–2 ft. long, $\frac{1}{2}$ –1 in. broad; of older plants forming a dense round head at the top of the stem or branches, $1\frac{1}{2}$ –3 ft. long, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. broad, ensiform, acute or acuminate, contracted just above the broad sheathing base but not petiolate, flat, firm, coriaceous; midrib indistinct; veins numerous, fine, parallel. Panicles terminal, erect or drooping, large, 2–4 ft. long, 1–2 ft. diam., much

and repeatedly branched; branches spreading, with long lanceolate bracts at the base. Flowers $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., crowded, white, sweet-scented, very shortly pedicelled; bracteoles 3, ovate-deltoid. Perianth-segments linear-oblong, obtuse, recurved. Stamens almost equalling the segments; anthers oblong. Style subulate; stigma 3-cuspidate. Berry white or bluish-white, globose, $\frac{1}{4}$ in. diam. Seeds 1–3 in each cell, black, angled.—*Handb. N.Z. Fl.* 281; *Bot. Mag.* t. 5636 (not t. 2835); *Kirk, Forest Fl.* t. 141. *C. superbians*, *C. Koch, Wochen.* (1859) 381. *C. indivisa*, *Regel, Gartenfl.* (1859) 331 (not of *Steud.*). *C. lentiginosa*, *Linden and Andre, Illustr. Hort.* xvii. (1870) t. 35. *C. Veitchii*, *Regel, Gartenfl.* (1871) 149. *C. calocoma*, *Hort. ex Baker, Journ. Linn. Soc.* xiv. (1875) 542. *C. Forsteri*, *F. Muell. Select Pl.* 58. *C. Sturmii*, *Col. in Trans. N.Z. Inst.* xv. (1883) 331. *Dracæna australis*, *Forst. Prodr.* n. 151; *A. Rich. Fl. Nouv. Zel.* 149. *Dracænopsis australis*, *Planch. in Fl. des Serres* (1850–51) sub. t. 569.

NORTH AND SOUTH ISLANDS: Abundant throughout. STEWART ISLAND: Rare, *Kirk*. Sea-level to 2500 ft. *Ti*; *Ti-kauka*; *Ti-rahau*; *Palm-lily*. November–January.

Universally known to New Zealand residents by the inappropriate name of “cabbage-tree” The foliage yields a strong and durable fibre, and has been recommended for paper-making Largely planted for scenic effect in gardens and shrubberies, and extensively grown for decorative purposes in Europe. Varieties with bronzy or variegated foliage are occasionally seen. Mr. Colenso’s *C. Sturmii* has broader and thinner leaves, and may be entitled to recognition as a variety, but at present I am only acquainted with it through a single indifferent specimen.

4. *C. indivisa*, *Steud. Nom. ed. ii.*, i. 419.—Stem stout, erect, rarely branched, 5–25 ft. high. Leaves very numerous, spreading all round and forming an enormous massive head, 2–6 ft. long, 4–6 in. broad at the middle, broadly ensiform, acuminate, usually contracted below and again expanded at the sheathing base, excessively thick and coriaceous, flat, greenish with a faint purplish or reddish tint above, glaucous beneath, midrib very thick and prominent at the base, but gradually decreasing in size upwards, lateral veins very numerous, strong, parallel, oblique to the midrib and with it usually coloured red or reddish-yellow. Panicle very large, densely branched, pendulous, 2–4 ft. long including the stout peduncle; bracts at the base broad, massive, the lower ones usually exceeding the panicle; branches very close-set, divided at the base, simple above, 1 in. across with the flowers on. Flowers shortly pedicelled, densely crowded, $\frac{1}{3}$ in. long, white; bracteoles of the lower flowers sometimes equalling them, of the upper ones minute. Perianth-tube campanulate; segments sharply recurved. Anthers broadly oblong. Berry $\frac{1}{4}$ in. diam., globose, bluish. Seeds 5–6 in each cell, angled; testa black, shining.—*Hook. f. Fl. Nov. Zel.* i. 258; *Gard. Chron.* (1860) 792; *Handb. N.Z. Fl.* 282. *C. Hookeri*,

Kirk in Trans. N.Z. Inst. vi. (1874) 245. *C. Hectori*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 334. *Dracæna indivisa*, *Forst. Prodr.* n. 150; *Pl. Escul.* n. 33; *A. Rich. Fl. Nouv. Zel.* 148; *A. Cunn. Precur.* n. 301.

NORTH ISLAND: Mountain districts from the Thames goldfields and Te Aroha southwards. SOUTH ISLAND: Along the western side from Collingwood and Westport to Dusky Sound. 1500-4000 ft. *Toii*. December-January.

By far the finest species of the genus. I have followed Sir J. D. Hooker in considering the plant common in subalpine localities in the North Island and north-west portion of the South Island to be the same as Forster's *Dracæna indivisa*, originally gathered in Dusky Sound. Most New Zealand botanists, however, treat the two forms as distinct, apparently on the ground of the supposed larger and longer flowers of the southern plant. But, so far as I am aware, flowering specimens of Forster's plant do not exist in any New Zealand herbarium, and the earlier descriptions are in conflict with one another as to the size of the flower. As there is little, if any, difference in habit or foliage, it appears to me that the most prudent course is to keep the two plants together until a thorough comparison of their characters can be made.

5. *C. pumilio*, *Hook. f. in Gard. Chron.* (1860) 792.—Small, usually stemless, but in some varieties with a short slender stem 1-3 ft. high. Leaves very numerous, densely rosulate, 1-3 ft. long, $\frac{1}{4}$ - $\frac{2}{3}$ in. broad, narrow-linear, acuminate, coriaceous; lateral veins several, evident, parallel; midrib stout, prominent on both surfaces; margins often finely scaberulous. Panicles terminal, erect or inclined, very slender, laxly branched, 1-3 ft. long; branches long, slender, spreading. Flowers irregularly scattered along the branches, rather remote, shortly pedicelled, small, white or bluish-white, $\frac{1}{8}$ in. diam.; pedicels variable in length. Perianth-segments oblong, obtuse. Berry globose, $\frac{1}{8}$ in. diam., bluish-white. Seeds 1 or 2 in each cell.—*Handb. N.Z. Fl.* 282. *C. stricta*, *Hook. f. Fl. Nov. Zel.* i. 257, t. 58 (not of *Endl.*).

NORTH ISLAND: From the North Cape to Wellington, but rare and local to the south of the East Cape. Sea-level to 1500 ft. *Ti-rauriki*. November-December.

A variable plant, but well marked by the small size, usually stemless habit, narrow leaves, lax slender panicle, and small flowers. The roots are fleshy and saccharine, and were formerly cooked and eaten by the Maoris.

4. *ASTELIA*, Banks and Sol.

Large or small densely tufted perennial herbs, usually more or less clothed with silky or chaffy hairs or scales. Leaves numerous, linear, all radical or crowded near the base of the stem, with broad imbricate sheathing bases. Flowering stem or scape usually long, panicked above and many-flowered, rarely short and few-flowered, usually densely silky or woolly. Flowers small, dioecious. Perianth persistent, 6-partite; segments subequal, connate at the base into a short hemispherical tube or distinct, spreading or reflexed. Male flowers: Stamens 6, affixed to the base of the segments; filaments filiform; anthers oblong or linear-oblong. Rudimentary ovary pre-

sent. Female flowers: Staminodia present. Ovary sessile, broadly ovoid or oblong, 1-celled with 3 parietal placentas, or 3-celled with the placentas in the axis; ovules numerous on each placenta; style very short; stigma 3-lobed. Fruit an indehiscent more or less fleshy oblong or ovoid or subglobose berry. Seeds several, ovoid or oblong, straight or curved, terete or angular; testa black, crustaceous; embryo small, cylindric; albumen fleshy.

A small genus of 12 or 13 species, with its headquarters in New Zealand, but with 1 species in south-eastern Australia and Tasmania, 1 in Fiji, 2 or 3 in the Sandwich Islands, and 1 in antarctic America. In New Zealand it forms a prominent part of the vegetation, especially in the northern forests, to which one or two of the species often give a peculiar aspect. The species are by no means easy of discrimination, partly from a certain amount of similarity in the foliage, and partly from the flowers being dioecious, thus making it difficult to match the sexes. When dealing with fresh specimens these difficulties in great measure disappear, particularly if due attention is paid to the structure of the ovary and the size and shape of the ripe fruit, both of which afford excellent characters. The student will find some valuable remarks on this point in Mr. Kirk's notes on the genus, published in Trans. N.Z. Inst., Vol. iv., pp. 241-247. With respect to the remarkable diversity existing in the genus in the placentation of the ovary, reference should be made to the "Flora Antarctica," Vol. ii., p. 357.

In the following arrangement I have adopted Hooker's identification of the two species originally described by Cunningham. But Cunningham's diagnoses, such as they are, do not satisfactorily match Hooker's plants, and it has been suggested that he had other species in his mind. The question is one which cannot be settled, if settled at all, without reference to Cunningham's collections, all of which are outside the colony, and beyond my reach. But taking into account Hooker's remarks in the "Flora of New Zealand" (Vol. i., p. 251), where he says, "Cunningham confused all the species and sexes, examined none, and referred at random to Banks and Solander's drawings and notes, substituting names of his own for theirs," it appears highly doubtful whether such an examination would be at all conclusive. An alteration of the present nomenclature, which has received universal acceptance, would be a matter much to be deplored.

I have had much trouble with the species, 10 in all, described by Colenso in the Trans. N.Z. Inst. Unfortunately, few of them are represented by named specimens in his herbarium; and his descriptions are so vague, and so much overloaded with trivial details, that it is difficult to come to an opinion respecting them. But I can see no grounds for supposing that they are really distinct, or represent anything more than individual differences.

A. Berry 1-celled. Ovules attached to 3 parietal placentas.

Small, subalpine. Leaves 1-8 in., glabrous or scaly.

Scape few-flowered. Berry oblong, $\frac{1}{3}$ - $\frac{1}{2}$ in. long .. 1. *A. linearis*.

Leaves 2-5 ft. \times $\frac{1}{2}$ -1 in., glabrous or silky. Scape panicle, many-flowered; female prostrate in fruit.

Berry globose, $\frac{1}{3}$ in. diam. Seeds terete .. 2. *A. Cunninghamii*.

B. Berry 3-celled. Ovules attached to the inner angles of the cells.

* Perianth not enlarged or coloured in fruit.

Leaves 2-6 ft. \times $\frac{1}{2}$ -1 $\frac{1}{2}$ in., not conspicuously 3-nerved.

Female scape stout, erect in fruit. Flowers $\frac{1}{2}$ in. long.

Berry $\frac{1}{3}$ in. long, ovoid, purplish-black. Seeds angled .. 3. *A. Banksii*.

- Leaves 3-6 ft. \times $\frac{3}{4}$ -1 $\frac{1}{4}$ in., conspicuously 3-nerved and plaited. Female scape prostrate in fruit. Flowers $\frac{1}{4}$ in. long. Berry $\frac{1}{2}$ in. diam., globose, red 4. *A. trinervia*.
 Leaves 2-5 ft. \times 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ in., conspicuously 3-nerved, not plaited. Flowers large, narrow, $\frac{1}{2}$ in. long. Female scape not prostrate in fruit. Berry $\frac{1}{2}$ in. diam., globose, red 5. *A. Solandri*.

** Perianth enlarged in fruit, coloured within.

- Leaves 2-6 ft. \times $\frac{1}{2}$ -4 in., 3-nerved. Flowers $\frac{1}{2}$ in. long, dark purplish-green. Female scape very stout, erect in fruit. Berry ovoid-globose, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., orange-yellow 6. *A. nervosa*.

1. *A. linearis*, Hook. f. *Fl. Antarct.* i. 76.—A small densely tufted herb. Rhizome creeping, branched, clothed with the shaggy bases of the old leaves. Leaves terminating the branches of the rhizome, all radical, crowded, spreading, 1-8 in. long, $\frac{1}{10}$ - $\frac{1}{4}$ in. broad, narrow-linear, acute or acuminate, sheathing at the base, thick and coriaceous, nerved, often channelled above, slightly keeled beneath, margins recurved, both surfaces clothed when young with silvery or reddish-brown erect or appressed scales, becoming almost glabrous when old; sheaths broad, appressed, membranous, scarious, thickly covered with narrow hyaline silvery scales. Male flowers: Scape slender, equalling the leaves or shorter than them, simple or forked, 3-9-flowered; bracts 1-2, linear-elongate; pedicels rather long, slender. Perianth-segments silky externally, spreading or reflexed, knobbed at the tip. Filaments much shorter than the segments; anthers oblong. Rudimentary ovary broad, narrowed into a short thick style. Female flowers: Scape very short, almost concealed at the base of the leaves, 1-5-flowered. Perianth-segments longer and narrower, erect. Staminodia present, minute. Ovary large, narrow oblong-ovoid, 1-celled; stigma-sessile, 3-lobed; ovules numerous, attached in 2 series to 3 parietal placentas. Berry large for the size of the plant, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, narrow-oblong, obscurely trigonous, fleshy, red. Seeds obovoid, not angled, smooth, black, shining.—*Handb. N.Z. Fl.* 284. *A. minima*, Col. in *Trans. N.Z. Inst.* xxviii. (1896) 611.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Moist ground in subalpine localities from the East Cape and Ruapehu southwards, not uncommon. Usually from 3000 ft. to 5000 ft., but descends to sea-level in Stewart Island and the Auckland Islands. November-January.

2. *A. Cunninghamii*, Hook. f. *Fl. Nov. Zel.* i. 259.—A densely tufted species, epiphytic or terrestrial. Leaves numerous, 2-5 ft. long, $\frac{1}{2}$ -1 in. broad at the middle, drawn out into a long acuminate point, contracted below, and then gradually widened into a broad sheathing base, rigid and coriaceous, glabrous or sparingly silky above, clothed with a thin silvery pellicle beneath, midrib and margins silky, nerves 10-12, usually one stronger than the rest on each

side of the midrib, or sometimes a prominent bundle of 2-3 placed close together; margins recurved; sheathing base clothed with long dense white silky hairs. Male flowers: Scape 1-3 ft. long, very slender at the base, stouter above, trigonous, shaggy throughout with silky white hairs, panicked above; branches numerous, slender, often flexuous and interlaced; bracts long, leafy. Flowers numerous, small, $\frac{1}{8}$ in. long, greenish-yellow or reddish-yellow or maroon. Perianth-segments lanceolate, acuminate, spreading or reflexed, the 3 outer rather larger than the inner. Stamens about half as long as the segments; anthers small, broadly oblong. Female flowers: Scape shorter, with a smaller and more closely branched panicle, branches shorter and more erect. Flowers rather smaller; segments not so spreading. Ovary ovoid-globose, 1-celled; ovules attached to 3 parietal placentas. Berry red, globose, $\frac{1}{8}$ in. diam. Seeds linear-oblong, curved, terete, not angled.—*Handb. N.Z. Fl.* 283. *A. polyneuron*, *Col. in Trans. N.Z. Inst.* xiv. (1882) 333. (?) *A. graminifolia*, *Col. l.c.* xix. (1887) 267. *Hamelinia veratroides*, *A. Rich. Fl. Nouv. Zel.* 158, t. 24, excl. fig. c. d.

Var. Hookeriana, *Kirk in Trans. N.Z. Inst.* iv. (1872) 244.—Smaller and more slender, seldom exceeding 3 ft. Scape very slender; branches of male panicle seldom interlacing. Flowers rather smaller, claret-coloured. Berry nearly black, placentas very feebly developed.

NORTH ISLAND: Abundant in woods throughout. **SOUTH ISLAND:** Nelson—Near Collingwood, *Travers*; Westport, *Townson*! Charlestown, *Kirk*! Sea-level to 2500 ft. *Kowharawhara*. December-January; ripe fruit November-December. **Var. Hookeriana:** Lava-fields on the Auckland Isthmus, Rangi-toto Island, Little Barrier Island, &c. April-June; ripe fruit May-June.

Very near to *A. Banksii* in habit and general appearance, but widely differing in the 1-celled ovary and small globose berry with terete seeds. I have quoted *A. Richard's Hamelinia veratroides* as a synonym, his drawing of the female panicle exactly corresponding; but the section of the ovary given is that of *A. Banksii*, probably through some confusion of specimens.

3. A. Banksii, *A. Cunn. Precur.* n. 296.—A large densely tufted terrestrial or rupestral species. Leaves very numerous, closely packed, erect, 2-6 ft. long, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. broad at the middle, narrow-linear, tapering into a long acuminate point, narrowed below and then gradually expanded into a broad sheathing base, glabrous or slightly scurfy above, clothed with a thin silvery pellicle beneath, with 3-6 distinct and equally prominent nerves on each side of the midrib; margins recurved; sheathing base most densely clothed with long soft silky hairs. Male flowers: Scape slender at the base, stouter above, trigonous, excessively shaggy with dense white silky hairs, panicked; branches numerous, slender, often flexuous, 4-9 in. long; bracts at the base leafy, with long slender points. Flowers many, about $\frac{1}{4}$ in. long; perianth-segments ovate-lanceolate, acuminate, spreading, the 3 outer larger than the inner. Stamens shorter than the segments; filaments subulate;

anthers oblong. Female flowers: Scape shorter and stouter; branches shorter, crowded, more erect. Flowers smaller; perianth-segments ovate-oblong, acute, erect. Ovary ovoid-conical, 3-celled; ovules pendulous from the inner angle of each cell; stigmas 3, sessile. Berry ovoid, $\frac{1}{3}$ in. long, purplish-black when fully ripe, reddish-purple when immature. Seeds sharply angled; testa black.—*Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 260; *Handb. N.Z. Fl.* 284.

NORTH ISLAND: From the North Cape to Hawke's Bay and Taranaki; usually near the coast. Sea-level to 2500 ft. April; ripe fruit February to March.

Usually taller and stouter than *A. Cunninghamii*, with larger broader leaves, larger flowers, and much stouter female scape, erect in fruit. The ovary is essentially different, being 3-celled, with the ovules attached to the inner angles of the cells; and the large ovoid berry, with its angled seeds, is altogether unlike the small globose one of *A. Cunninghamii*, with its terete seeds. It is an abundant plant on the coast-line of the northern half of the North Island, often forming a large portion of the undergrowth on wooded headlands or steep declivities near the sea.

4. *A. trinervia*, *T. Kirk in Trans. N.Z. Inst.* iv. (1872) 246.—A large densely tufted terrestrial species. Leaves numerous, 3–6 ft. long or even more, $\frac{3}{4}$ –1 $\frac{3}{4}$ in. broad at the middle, tapering into a long attenuated point, narrowed below and then gradually expanded into a broad sheathing base, not so coriaceous as in *A. Banksii*, pale-green, plaited, glabrous above, clothed with a thin silvery pellicle beneath, conspicuously 3-nerved with less evident nerves between; margins broadly recurved; sheathing base clothed with long white silky hairs. Male flowers: Scape long, slender, densely shaggy with white silky hairs, panicle; branches slender, flexuous and often interlaced, 6–12 in. long or more; bracts large, foliaceous. Flowers numerous, $\frac{1}{4}$ in. long; perianth-segments lanceolate, acuminate, spreading. Stamens shorter than the segments; filaments slender; anthers oblong. Female flowers: Scape as in the male but panicle smaller with fewer, shorter, and more erect branches. Flowers smaller; perianth-segments shorter, erect. Ovary globose, 3-celled; ovules pendulous from the inner angles of the cells; stigmas 3, sessile. Fruiting-scape usually prostrate. Berry globose, $\frac{1}{3}$ in. diam., bright-red. Seeds sharply angled, testa black.

NORTH ISLAND: In woods from the North Cape to Wellington, very plentiful north of the East Cape and Taupo. SOUTH ISLAND: Marlborough – Rai Valley, *Macmahon!* Sea-level to 3000 ft. *Kauri-grass*. March–May; ripe fruit February and March.

Separated from *A. Banksii* by the larger size and less rigid habit, broader and softer pale-green conspicuously 3-nerved and plaited leaves, prostrate fruiting-scape, and red globose berry.

5. *A. Solandri*, *A. Cunn. Precur.* n. 297.—Large, densely tufted, often forming immense clumps on the limbs and trunks of forest-

trees or on rocks. Leaves very numerous, spreading and recurved, 2–5 ft. long, $1\frac{1}{2}$ –3 in. wide at the middle, linear-ensiform, narrowed above into a long acuminate point, suddenly expanded below into a sheathing base sometimes 4–5 in. across, conspicuously 3-nerved, glabrous and deeply channelled in front, keeled and with a thin white silvery pellicle beneath; sheathing base black, at the extreme base white and fleshy, glabrous or clothed with copious long white silky hairs. Male flowers: Scape stout, much shorter than the leaves, densely silky below, panicled; branches few, 5–8, simple, 3–9 in. long, 1 in. broad with the flowers on; bracts at the base of the branches very large, leafy, acuminate. Flowers very numerous, densely crowded, $\frac{1}{2}$ in. long, pale lemon-yellow; pedicels slender, $\frac{1}{4}$ in., each subtended by a linear bract. Perianth 6-parite; segments reflexed, linear, obtuse, silky externally. Stamens as long as the segments; anthers linear, erect, sagittate at the base. Female flowers: Scape stout, branched as in the male; but branches longer and more slender, sometimes 12–14 in. long by $\frac{3}{4}$ in. diam., usually drooping in fruit. Flowers much smaller; perianth with a hemispherical tube closely surrounding the ovary; segments reflexed. Ovary globose, 3-celled; ovules numerous, attached to the inner angles of the cells. Berry rather small, $\frac{1}{5}$ in. diam., globose, bright-red. Seeds small, obovoid, slightly curved, not angled, black.—*Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 260; *Handb. N.Z. Fl.* 284; *Bot. Mag.* t. 5503. *A. microsperma*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 251. *A. albicans*, *Col. l.c.* 252. *A. hastata*, *Col. l.c.* xix. (1887) 265.

NORTH ISLAND: Abundant in forests throughout. SOUTH ISLAND: Marlborough—Queen Charlotte Sound, *Banks*, and *Solander*; Pelorus Valley, *Rutland*, *Macmahon*! Nelson—Common on the West Coast, from Collingwood southwards. Sea-level to 2700 ft. *Kahakaha*. January–February.

A very distinct species, at once known by the broad almost glabrous 3-nerved leaves with a nearly black sheathing base, by the densely placed flowers, the males being much longer and narrower than in any other species, and by the small red globose berry. It is a conspicuous plant in all the forest districts of the North Island, from its habit of growing perched high up on the limbs of tall forest-trees, where it forms huge tufts resembling the nests of some gigantic bird, for which, in fact, it was mistaken when first seen by Cook and his officers in 1769.

6. *A. nervosa*, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i. 260.—Stout, densely tufted, often forming large masses in moist or boggy ground. Leaves numerous, spreading, 2–5 or even up to 8 ft. long, $\frac{1}{2}$ –3 in. broad, or in large specimens as much as 4 in., linear-lanceolate or linear-ensiform, acuminate, dilated at the sheathing base, coriaceous, many-nerved, one nerve on each side stouter than the rest and with the midrib often coloured red, glabrous above or rarely silky, beneath more or less scurfy or clothed with silky appressed hairs, rarely almost glabrous; margins recurved, usually silky; sheathing base densely villous with long

silky hairs. Male flowers: Scape very stout, erect, 6 in. to 2 ft. long, thickening upwards to the base of the panicle, where it is sometimes $1\frac{1}{2}$ in. diam., obtusely triquetrous, lower portion shaggy with copious long silky hairs, upper part silky or glabrate. Panicle 4–16 in. long, much branched; bracts very long, lanceolate, acuminate. Flowers scattered, dark-green or purplish-green, sweet-scented, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; pedicels $\frac{1}{10}$ – $\frac{1}{6}$ in. long. Perianth-segments ovate-lanceolate, spreading, ultimately reflexed. Stamens equaling the segments; filaments subulate; anthers broadly oblong. Female flowers: Scape as in the male but shorter; panicle much shorter and more compact; branches short, stiff, erect. Flowers smaller, crowded, purplish-black, pedicels very short. Perianth segments smaller, reflexed. Ovary broadly conical, faintly grooved, 3-celled; ovules numerous, attached to the inner angle of the cells. Berry globose, $\frac{1}{2}$ – $\frac{2}{3}$ in. diam., orange-yellow, base enclosed in the persistent and enlarged tube of the perianth, which is also coloured yellow inside. Seeds 2–5 in each cell, smooth, black, sharply angled. — *Hook. f. Handb. N.Z. Fl.* 284. *A. grandis*, *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* iv. (1872) 245. *A. fragrans*, *Col. in Trans. N.Z. Inst.* xv. (1883) 333.

Var. *montana*, *Kirk, MS.*—Smaller in all its parts. Leaves rigid, usually silky on both surfaces, sometimes villous. Scape shorter and panicle smaller, but flowers apparently the same as in the type.—*A. Petriei, Cockayne in Trans. N.Z. Inst.* xxxi. (1899) 419.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 4500 ft. October–January.

An excessively variable plant. Banks and Solander's description and drawing, which must be taken to represent the type, exactly match a large broad-leaved form, common in many lowland districts in both the North and South Islands, which has been described as a distinct species under the name of *A. grandis*. Sylvestral states of this have longer and narrower softer leaves, with a longer and more slender male panicle, but the flowers and fruit present no differences of importance. At higher altitudes, and particularly in exposed localities, the leaves are smaller, narrower, and often rigid, and usually much more silky or villous than the type. Further research may disclose characters sufficient to separate this as a species.

5. DIANELLA, Lam.

Glabrous perennial herbs. Rootstock often branched. Leaves numerous, crowded at the base of the stem, linear, distichous, equitant and sheathing at the base. Flowers pedicellate, nodding, laxly cymose; cymes arranged in a broad open terminal panicle. Perianth marcescent; segments 6, distinct, spreading. Stamens 6, hypogynous, or the 3 inner affixed to the base of the segments; filaments thickened; anthers erect or recurved, basifixed, opening by terminal pores or short longitudinal slits. Ovary sessile or shortly stalked, 3-celled; ovules 4–8 in each cell; style filiform; stigma minute. Fruit a globose berry. Seeds few, ovoid or compressed; testa black, smooth and shining; albumen fleshy; embryo small, linear.

Species 11 or 12, chiefly Australian, but found also in New Zealand, Polynesia, tropical Asia, and the Mascarene Islands. The single New Zealand species extends to Norfolk Island and several parts of Polynesia.

1. **D. intermedia**, *Endl. Prodr. Fl. Ins. Norfolk*. 28.—Rhizome stout, woody, creeping, usually with underground runners. Leaves numerous, crowded at the top of the rhizome, distichous and sheathing at the base, $1\frac{1}{2}$ –3 ft. long or more, $\frac{1}{2}$ – $\frac{3}{4}$ in. wide, narrow linear-ensiform, acute or acuminate, keeled, margins and keel minutely scabrid. Panicle 6–24 in. long, much branched; peduncles and pedicels slender, the latter curved. Flowers small, $\frac{1}{4}$ – $\frac{1}{3}$ in. diam., greenish or purplish-white. Perianth-segments oblong, spreading; the 3 outer usually 5–6-nerved; the 3 inner rather broader, 3-nerved. Filaments expanded into a yellow or orange struma often thicker than the anther; anther linear-oblong, yellow. Berry $\frac{1}{2}$ – $\frac{3}{4}$ in. long, broadly oblong, bright-blue.—*A. Cunn. Precur.* n. 300; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 255; *Handb. N.Z. Fl.* 283. *D. nigra*, *Col. in. Trans. N.Z. Inst.* xvi. (1884) 339. *D. reflexa*, *Col. l.c.* xxvii. (1895) 396.

NORTH AND SOUTH ISLANDS: From the Three Kings Islands and the North Cape to Foveaux Strait, abundant. Sea-level to 2500 ft. *Turutu*. November–December.

6. PHORMIUM, Forst.

Tall rigid and coriaceous herbs. Rhizome short, stout, branched, with thick and fleshy perpendicular rootlets. Leaves all radical, long, linear-ensiform, equitant and distichous, exceedingly tough and coriaceous. Flowering stem or scape tall, leafless, with alternate bracteate branches at the top; bracts caducous. Flowers pedicelled on the branches of a terminal panicle, dull-red or yellow; pedicels jointed. Perianth tubular, curved; segments 6, connate at the base, free but connivent above; the 3 outer lanceolate, erect, acute; the 3 inner rather longer, with spreading tips. Stamens 6, inserted at the base of the segments and longer than them; filaments filiform; anthers linear-oblong. Ovary sessile, oblong, obtusely trigonous, 3-celled; style slender, equalling or exceeding the stamens, declinate; stigma small, capitate; ovules numerous in each cell. Capsule subcoriaceous or almost membranous, oblong or linear, trigonous or almost terete, straight or twisted, loculicidally 3-valved. Seeds many, oblong, greatly compressed; testa black, shining.

Phormium, or the "New Zealand flax," is a very remarkable genus of 2 species, confined to New Zealand and Norfolk Island. Its value as producing one of the strongest and most durable fibres of the vegetable kingdom is too well known to require recapitulation here.

Leaves 3–9 ft., dark-green, glaucous beneath; margins usually bordered with a coloured line. Flowers dull-red. Capsule short, erect or inclined, trigonous, 2–4 in. long

1. *P. tenax*.

Leaves 2-5 ft., pale-green, less rigid; margins seldom coloured. Flowers yellowish. Capsule long, pendulous, cylindrical, terete, twisted, 4-7 in. long 2. *P. Cookianum*.

1. *P. tenax*, *Forst. Char. Gen.* 48.—Leaves 3-9 ft. long or more, 2-5 in. broad, linear-ensiform, acute or acuminate, apex slit when mature, distichous and equitant at the base, flat above, keeled, very tough and coriaceous, dark-green above, often glaucous beneath, margins and midrib bordered with a red or orange line. Scape very variable in height, 5-15 ft., glabrous, terete, reddish-purple. Flowers numerous, 1-2 in. long, usually dull-red. Inner perianth-segments erect or slightly recurved at the tip. Capsule erect or inclined, stout, trigonous, 2-4 in. long, not twisted.—*A. Rich. Fl. Nouv. Zel.* 153; *A. Cunn. Precur.* n. 304; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 256; *Handb. N.Z. Fl.* 286.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Abundant throughout, especially in lowland swamps and alluvial grounds. Sea-level to 4000 ft. *New Zealand Flax*; *Harakeke*; *Korari* (the scape); *Muka* (the fibre). November-January.

A familiar plant to all residents in New Zealand, and, with the exception of certain well-known timber-trees, probably of more economic importance than any other indigenous species. For information as to its value as a fibre-plant, and for full particulars as to the mode of preparing the fibre, its microscopical and chemical properties, &c., reference should be made to "*Phormium tenax* as a Fibrous Plant," edited by Sir James Hector, and issued by the Geological Survey Department (second edition, Wellington, 1889). This publication also contains a bibliography of the numerous official reports, memoirs, and short papers which have been published from time to time in reference to *Phormium*, several of them containing much valuable information.

P. tenax varies much in size, the colour of the leaf and the extent to which it is recurved and split at the tip, the tint of the coloured line bordering the margins and midrib, the colour of the flowers, and the size of the capsule. Some of the varieties also differ considerably in the strength of the fibre. Considering the economic importance of the plant, it is singular that no systematic attempt has been made to collect the whole of the varieties and cultivate them side by side in one at least of the public gardens of the colony. Until this is done, it is practically impossible to describe them in a scientific manner. Isolated descriptions of a few, without comparison with the rest, would be of little use. Some varieties with the leaves variegated in a riband-like manner with white or creamy-yellow, and others with bronzy foliage, are largely cultivated for ornamental purposes, but are not usually capable of being reproduced by seed.

2. *P. Cookianum*, *Le Jolis in Bull. Soc. Hort. Cherb.* 71.—Much smaller and less rigid than *P. tenax*. Leaves 2-5 ft. long, rarely more, 1-2½ in. broad, acuminate, apex sometimes conspicuously split, but usually much less so than in *P. tenax*, pale-green, seldom glaucous, margins and midrib not usually bordered with a coloured line. Scape 2-7 ft. high, much more slender and with a smaller panicle, green. Flowers 1-1½ in. long; the outer segments yellow or yellowish-red, the inner green or greenish-yellow, with evidently recurved tips. Capsule long, pendulous, cylindrical, terete, twisted, 4-7 in. long.—*P. Colensoi*, *Hook. f. in*

Raoul, Choix, 41; *Handb. N.Z. Fl.* 286. *P. Forsterianum*, *Col. in Hook. Lond. Journ. Bot.* iii. (1844) 8. *P. Hookeri*, *Gunn in Bot. Mag. t.* 6973.

NORTH AND SOUTH ISLANDS: Not uncommon from the North Cape to Foveaux Strait. Sea-level to 4000 ft. *Wharariki*. November-January.

The small size, pale colour, yellowish flowers, and long twisted capsules distinguish this from *P. tenax*; but it is in some respects an ill-defined species, including several forms respecting which additional information is required. One of these, figured in the "Botanical Magazine" under the name of *P. Hookeri*, is remarkable for its flaccid much recurved leaves with long fissured tips. Sir J. D. Hooker considers that it is more different from *P. tenax* and *P. Cookianum* than they are from one another; but his plate shows the floral characters to be very similar to those of *P. Cookianum*.

7. BULBINELLA, Kunth.

Perennial herbs. Rootstock short, stout, with numerous fleshy almost tuberous roots. Leaves all radical, numerous, linear, sheathing at the base, often fleshy. Scape simple or very rarely branched, naked, terminating in a dense many-flowered raceme. Flowers rather small, yellow or white. Perianth marcescent, 6-partite; segments subequal, distinct or slightly connate at the base, 1-nerved. Stamens 6, hypogynous or adnate to the base of the segments; filaments subulate-filiform; anthers versatile. Ovary subglobose, 3-celled; style filiform; stigma small, capitate, obscurely 3-lobed; ovules 2 in each cell. Capsule broadly ovoid or subglobose, membranous, 3-celled, loculicidally 3-valved. Seeds few, often compressed and triquetrous; testa black.

About 14 species are known, all confined to South Africa with the exception of the two described herein.

Very stout. Leaves often 2 in. broad; scape 2-3 ft. high.

Flowers diœcious 1. *B. Rossii*.

More slender. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in. broad; scape 1-2 ft. high.

Flowers hermaphrodite 2. *B. Hookeri*.

1. *B. Rossii*, *Benth. and Hook. f. Gen. Plant.* iii. 784.—A stout perennial herb 9 in. to 3 ft. high; stems sometimes $1\frac{1}{2}$ in. diam. at the base. Leaves numerous, all radical, outer spreading or recurved, inner ascending, 6 in. to 2 ft. long, $\frac{1}{2}$ -2 in. broad, broadly ensiform, obtuse or subacute, fleshy, glabrous, concave above, finely striate. Scape stout, erect, terete, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam. Raceme very stout and dense, 3-6 in. long, 1-2 $\frac{1}{2}$ in. diam. Flowers numerous, very densely crowded, bright-yellow, polygamo-diœcious, $\frac{1}{8}$ in. diam.; pedicels slender, erect, $\frac{1}{2}$ - $\frac{3}{4}$ in. long; bracts lanceolate. Perianth-segments linear-oblong or oblong-ovate, obtuse, spreading in the male flowers, more erect in the female. Stamens of the male flowers shorter than the segments; filaments subulate, terete, glabrous; anthers oblong. Ovary of the females broadly ovoid; style short, stout; stigma small, obscurely lobed. Capsule $\frac{1}{4}$ - $\frac{1}{3}$ in.

long, broadly ovoid. Seeds usually 2 in each cell, trigonous; testa black, shining.—*Chrysobactron Rossii*, *Hook. f. Fl. Antarct.* i. 72, t. 44, 45. *Anthericum Rossii*, *Hook. f. Handb. N.Z. Fl.* 285.

AUCKLAND AND CAMPBELL ISLANDS: Abundant. December-January.

A most magnificent plant, excellently figured and described in the "Flora Antarctica." Sir J. D. Hooker states that he has seen a specimen between 3 ft. and 4 ft. high, having 3 crowns of leaves, and bearing no less than 7 racemes of flowers. In some localities on Campbell Island it forms so large a proportion of the vegetation, and the golden-yellow flowers are so abundantly produced, that its presence can be observed at a distance of more than a mile from the shore.

2. *B. Hookeri*, *Benth. and Hook. f. Gen. Plant.* iii. 784.—Very variable in size, usually from 1 to 2 ft. high, but sometimes attaining 3 ft., and occasionally dwarfed to 3 or 4 in. Leaves numerous, narrower in proportion than in *B. Rossii*, $\frac{1}{6}$ – $\frac{3}{4}$ in. broad, narrow-linear, gradually tapering upwards, channelled in front, glabrous. Scape much more slender than in *B. Rossii*; racemes not so dense-flowered, varying in length from 1 to 10 in. Flowers $\frac{1}{2}$ in. diam., bright-yellow, hermaphrodite; pedicels slender, longer or shorter than the lanceolate bracts. Perianth-segments linear-oblong, obtuse, spreading. Stamens $\frac{3}{4}$ the length of the segments; filaments very slender, glabrous. Capsule oblong, $\frac{1}{4}$ in. long.—*Chrysobactron Hookeri*, *Col. in Hook. Ic. Plant.* t. 817; *Hook. f. Fl. Nov. Zel.* i. 255; *Bot. Mag.* t. 4602. *Anthericum Hookeri*, *Col. in Hook. f. Handb. N.Z. Fl.* 286.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Mountain districts from Lake Taupo and Mount Egmont southwards, abundant. Sea-level to 4500 ft. October-January.

8. *ARTHROPODIUM*, R. Br.

Tufted perennial herbs, with fleshy fibrous roots. Leaves radical or crowded near the base of the stem, linear or lanceolate, sheathing at the base. Scape or peduncle simple or branched above. Flowers in simple or branched racemes or panicles, white or purplish; pedicels slender, jointed at the middle, solitary or few together in the axil of a scarious bract. Perianth persistent but not twisted, 6-partite; segments distinct, spreading, 3-nerved, sub-equal or the inner rather broader. Stamens 6, hypogynous or attached to the very base of the segments, shorter than the perianth; filaments bearded; anthers linear, erect, basifixed, introrsely dehiscent. Ovary sessile, 3-celled; ovules several in each cell; style filiform; stigma small. Capsule subglobose, loculicidally 3-valved. Seeds usually few in each cell, angular; testa black, smooth or minutely granulate.

Besides the two species found in New Zealand, both of which are endemic, there are 5 or 6 in Australia, and 1 in New Caledonia.

Tall and stout, 1-2½ ft. Leaves fleshy, 1-2 in. broad.

Flowers ¾-1 in. diam. 1. *A. cirrhatum*.

Slender, 3-12 in. high. Leaves grassy, flaccid, 1/10-¼ in.

broad. Flowers ¼ in. diam. 2. *A. candidum*.

1. *A. cirrhatum*, *R. Br. in Bot. Mag.* t. 2350.—A perfectly glabrous tufted herb 1-3 ft. high; root with copious long fleshy fibres. Leaves numerous, spreading, 1-2 ft. long, 1-2½ in. broad, lanceolate or oblanceolate, acute or acuminate, narrowed to an equitant and subdistichous base, flat or obtusely keeled, rather fleshy. Scape stout, terete, naked; panicle large, often 1 ft. long, deltoid, much branched; primary bracts broad, foliaceous. Flowers white, ¾-1 in. diam., 1-3 together along the branches of the panicle; pedicels 1/3-2/3 in. long. Perianth-segments oblong-lanceolate, acuminate. Filaments filiform at the base, provided above the middle with a thickened densely woolly appendage, which is produced downwards into 2 woolly tails. Capsule oblong-globose, 1/3 in. long. Seeds black, opaque, angular.—*A. Cunn. Precur.* n. 299; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 254; *Handb. N.Z. Fl.* 285. *Anthericum cirratum*, *Forst. Prodr.* n. 148; *A. Rich. Fl. Nouv. Zel.* 155.

NORTH ISLAND: From the Three Kings Islands and the North Cape to Wellington, not uncommon, especially near the sea. SOUTH ISLAND: Nelson—Takaka, *Kingsley*; West Wanganui, *Hursthouse*. *Rengarenga*. November-December.

This differs from the other species of the genus in the woolly thickening at the middle of the filament being 2-lobed at the base, the lobes being revolute at the tip, somewhat after the fashion of a tendril, from whence the specific name.

2. *A. candidum*, *Raoul, Choix Pl. Nouv. Zel.* 14, t. 6.—A small slender glabrous herb 3-14 in. high; stem often swollen below the leaves and almost bulbous; roots long, fleshy. Leaves variable in length, 2-10 in. long, 1/10-¼ in. broad, very narrow-linear, flat, grassy, membranous and flaccid. Scape very slender; raceme simple, rarely branched, usually overtopping the leaves. Flowers few or many, usually secund, solitary or the lower ones in twos or threes, white, ¼ in. diam.; pedicels slender, spreading or drooping; bracts long, linear-lanceolate, acuminate. Filaments naked at the base, then densely hairy almost up to the anther. Capsule globose, membranous, 1/6 in. diam. Seeds 2-3 in each cell, black, angled.—*Hook. f. Fl. Nov. Zel.* i. 254; *Handb. N.Z. Fl.* 285. *A. reflexum*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 275. *A. ramulosum*, *Col. l.c.* xxv. (1893) 337.

NORTH AND SOUTH ISLANDS: From Cape Colville southwards to Foveaux Strait, not uncommon. Sea-level to 3500 ft. November-January.

I cannot see upon what grounds Mr. Colenso has distinguished his two species. The type specimens in his herbarium exactly match ordinary states of *A. candidum*.

9. **HERPOLIRION**, Hook. f.

A dwarf perennial herb. Rhizome slender, creeping, branched. Leaves crowded on short shoots from the rhizome, all radical, linear, distichous, sheathing at the base. Flower solitary, terminal, almost sessile amongst the leaves. Perianth funnel-shaped, persistent, 6-partite; segments distinct, linear, subequal, 5-nerved. Stamens 6, attached to the base of the segments and shorter than them; filaments filiform; anthers linear, erect, twisted after flowering, cells introrse, longitudinally dehiscent. Ovary subglobose, sessile, 3-celled; ovules several in each cell; style filiform; stigma terminal, punctiform. Capsule globose, enclosed in the persistent perianth, 3-celled, loculicidally 3-valved. Seeds oblong, subcompressed, quite smooth; testa black, crustaceous.

A monotypic genus confined to the mountains of New Zealand, Tasmania, and south-eastern Australia.

1. *H. novæ-zeelandiæ*, Hook. f. *Fl. Nov. Zel.* i. 258.—Small, often forming broad patches in subalpine swamps. Leaves crowded, flat or involute, linear, striate, glaucous; the outer spreading or recurved, 1–2½ in. long; the inner much shorter, reduced to erect lanceolate sheathing bracts. Flower almost sessile, large for the size of the plant, ½–¾ in. long, lilac-blue or white. Perianth-segments erect below, spreading from a little below the middle. Stamens about half as long as the segments; filaments flattened, pubescent; anthers shortly sagittate at the base. Capsule globose-trigonal, ¼–⅓ in. diam.—*Handb. N.Z. Fl.* 287. *H. Tasmaniæ*, Hook. f. *Fl. Tasm.* ii. 54, t. 132B.

NORTH ISLAND: Plains near Taupo, *Colenso!* *Tryon!* near Tongariro, *H. Hill!* *T. F. C.*; Whakaki, Hawke's Bay, *Bishop Williams!* SOUTH ISLAND, STEWART ISLAND: Not uncommon in subalpine swamps throughout. Usually from 2000 ft. to 4000 ft., but descends to sea-level in Otago and Stewart Island. December–January.

10. **IPHIGENIA**, Kunth.

Small glabrous herbs. Bulb tunicated. Stem simple, erect. Leaves few, scattered, linear, sheathing the stem. Flowers small, erect, solitary or corymbose. Perianth 6-partite, deciduous; segments free, all similar, linear or linear-oblong, spreading, flat. Stamens 6, hypogynous, shorter than the perianth; filaments flat; anthers oblong, versatile. Ovary superior, sessile, 3-celled; ovules numerous in each cell; styles 3, shortly connate at the base, linear, recurved, stigmatic along the inner edge. Capsule ovoid or oblong, 3–6-sulcate, 3-celled, loculicidally dehiscent. Seeds small, globose; testa thin, brown, appressed.

Besides the New Zealand species, which is endemic, there are two from India, one of which is also found in Australia, and one each from tropical Africa and Madagascar.

1. **I. novæ-zealandiæ**, Baker in *Journ. Linn. Soc.* xvii. (1879) 451.—Bulb (corm) subglobose, $\frac{1}{3}$ in. diam.; sheaths reddish, membranous. Stem 1–2 in. high. Leaves 2 or rarely 3, $\frac{1}{2}$ –3 in. long, narrow-linear, sheathing the greater part of the stem and exceeding it. Flower solitary, $\frac{1}{4}$ in. diam. Perianth-segments 4–6, ob lanceolate, acute, with 6–8 longitudinal veins. Stamens 4–6, slightly shorter than the segments; anthers white, subglobose. Ovary broadly oblong, 2–3-celled; styles 2, rarely 3, subulate. Capsule broadly oblong, usually 2-celled, $\frac{1}{6}$ – $\frac{1}{5}$ in. diam.—*Anguillaria novæ-zealandiæ*, Hook. f. ex T. Kirk in *Trans. N.Z. Inst.* x. (1878) App. xi.

SOUTH ISLAND: Canterbury—*Lyll*; swamps near Christchurch, *Armstrong*! near Burnham, *Kirk*! Banks Peninsula, *Cockayne*! Lake Grassmere, *J. D. Enys*! Rangitata Valley, *Haast*! Otago—*Otepopo*, *Petrie*! Sea-level to 2500 ft. November–December.

ORDER LXXXIII. JUNCACEÆ.

Perennial, rarely annual herbs. Rootstock short, stout, scaly. Stems usually simple, slender, stiff, erect, cylindrical or compressed, sometimes septate within. Leaves usually all radical, often rigid and terete like the stems, sometimes flat and grassy, occasionally absent or reduced to sheaths. Flowers small, green or brown, regular, hermaphrodite or more rarely unisexual, in axillary or terminal cymes or clusters, rarely solitary. Perianth inferior, coriaceous or scarious, persistent; segments 6 in 2 series, imbricate. Stamens usually 6, inserted on the bases of the perianth-segments, the 3 interior sometimes wanting; filaments free, flattened or filiform; anthers 2-celled, introrse. Ovary superior, 1-celled or 3-celled; style short or long; stigmas 3, filiform; ovules few or many, anatropous. Fruit a 1- or 3-celled capsule, loculicidally 3-valved. Seeds few or many, erect; testa membranous, often lax at each end; albumen copious, fleshy; embryo minute.

An order of moderate size, comprising 14 genera and about 250 species. The two typical genera (*Juncus* and *Luzula*) are widely dispersed, especially in temperate or extratropical regions; the remainder of the order is mainly Australian. The species have no important properties and cannot be said to possess any economic value.

Glabrous. Flower solitary. Ovary 1-celled, ovules many.

Style long 1. ROSTKOVIA.

Glabrous. Flowers several or numerous. Ovary often 3-celled, ovules many. Style short

2. JUNCUS.

Hairy. Flowers several or numerous. Ovary 1-celled, ovules 3. Style short

3. LUZULA.

1. ROSTKOVIA, Desv.

Densely tufted perennial herbs. Rhizome short, horizontal, branched. Stems crowded on the rhizome, strict, erect, terete. Leaves 1 or more, together with several sheathing scales at the

base of the stem. Flowers large, solitary, terminal; bracts at the base 1-3, the lowest one sometimes foliaceous. Perianth-segments 6, glumaceous, distinct, linear-subulate or linear-lanceolate, erect, rigid; margins often scarious. Stamens 6; filaments very short; anthers linear, erect, basifixed. Ovary sessile, 1-celled, with 3 parietal placentas; style stout, subulate, divided above into 3 linear stigmas; ovules numerous, anatropous. Seeds small; testa appendiculate or not; embryo very small, included in the base of the fleshy albumen.

A small genus of 3 species confined to New Zealand and antarctic South America.

Flowers $\frac{1}{4}$ in. long, exceeded by a foliaceous bract.

Capsule longer than the perianth. Seeds not tailed .. 1. *R. sphærocarpa*.

Flowers $\frac{3}{4}$ in. long; bract very short. Capsule not more than $\frac{1}{2}$ as long as the perianth. Seeds tailed .. 2. *R. gracilis*.

1. *R. sphærocarpa*, Desv. *Journ. Bot.* i. (1808) 327.—Perennial, densely tufted. Stems many, crowded, erect, terete, 4-9 in. high. Leaves several, equalling or exceeding the stems, sheathing at the base, erect, rigid, pungent, polished, channelled in front. Flower solitary, terminal, $\frac{1}{4}$ in. long; bracts 2, the lowest foliaceous, twice as long as the flower or more, upper small, scarcely equalling the flower. Perianth-segments nearly equal, linear-oblong, acute. Stamens shorter than the segments; filaments linear; anthers longer than the filaments, connective unguiculate. Capsule large, equalling or exceeding the perianth, ovoid-globose, mucronate, hard and almost woody, dark-chestnut, smooth and shining. Seeds obovoid, inappendiculate.—*R. magellanica*, Hook. *f. Fl. Antarct.* i. 81; *Handb. N.Z. Fl.* 291; *Buchen. Monog. Junc.* 70. *Juncus magellanicus*, Lam. *Encycl.* iii. 266.

CAMPBELL ISLAND: Mossy and springy places on the hills, Sir J. D. Hooker.

Also recorded from Fuegia, the Falkland Islands, and South Georgia, and said to have been gathered on the Andes of Quito at an elevation of 13000 ft. It is included in Armstrong's list of Canterbury plants (*Trans. N.Z. Inst.* xii. 344), but I believe erroneously.

2. *R. gracilis*, Hook. *f. Fl. Antarct.* i. 83, t. 47.—Perennial, densely tufted. Rhizome stout, horizontal or inclined. Stems numerous, crowded, erect, terete, smooth, 6-12 in. high, base with several pale or dark fulvous sheaths. Leaves 1-3, from slightly longer to 2 or even 3 times as long as the stems, slender, terete, rigid, grooved in front. Flower large, solitary, terminal, $\frac{1}{2}$ - $\frac{3}{4}$ in. long; bract solitary, very small, $\frac{1}{10}$ in. long, entire or 2-lobed. Perianth-segments linear-subulate, pale-chestnut, shining, the inner conspicuously shorter. Stamens 6, much shorter than the segments; filaments very short, broad and flat; anthers linear, 3 or 4 times as long as the filaments, connective unguiculate. Capsule

about $\frac{1}{3}$ in. long, narrow ovoid-oblong, obtusely trigonous, acute, chestnut-brown, coriaceous, smooth and shining, 3-valved. Seeds numerous, small, pale, produced at both ends into a long pearly-white appendage.—*Handb. N.Z. Fl.* 292. *R. novæ-zealandiæ*, Buch. in *Trans. N.Z. Inst.* iv. (1872) 227, t. 16. *Marsippospermum gracile*, Buchen. in *Abh. Ver. Bremen*, vi. (1879) 374; *Monog. Junc.* 68.

SOUTH ISLAND: Not uncommon in alpine localities, especially in the central and western portions of the Island, usually between 4500–7000 ft. **AUCKLAND AND CAMPBELL ISLANDS:** Not uncommon in rocky places, 500–1200 ft. December–February.

Easily distinguished from the preceding species by the larger flower, relatively smaller capsule, and tailed seeds. Mr. Buchanan's *R. novæ-zealandiæ* was published in the belief that the Auckland Islands plant always had the leaves solitary and 2 or 3 times longer than the stems, but in point of fact both New Zealand and Auckland Islands specimens are variable in the number and length of the leaves.

2. JUNCUS, Linn.

Perennial or more rarely annual herbs; stems usually densely tufted. Leaves mostly or all radical, stout or slender, terete, compressed or flat, sometimes reduced to sheathing scales. Flowers small, hermaphrodite, in axillary or terminal fascicles or cymes or panicles. Perianth-segments 6, glumaceous, distinct, lanceolate or oblong, margins often scarious, the 3 outer often with the midrib keeled or thickened. Stamens 6 or rarely 3. Ovary more or less perfectly 3-celled, rarely 1-celled; ovules usually numerous in each cell; style divided to the middle into 3 linear stigmatic lobes. Capsule completely or incompletely 3-celled, 3-valved. Seeds small, ovoid or obovoid; testa minutely striate and reticulate.

A large genus of about 150 species, many of them widely distributed and some almost cosmopolitan. Of the 16 species found in New Zealand, 5 have a wide range, especially in the Northern Hemisphere; 7 extend to Australia and Tasmania, but not to any other countries; one stretches through Australia to eastern Asia and as far northwards as China and Japan; another occurs in antarctic South America; and 2 are endemic.

A. Genuini. Stems tall, terete, produced beyond the cyme into an erect often pungent tip, base clothed with leafless sheaths. Leaves wanting, or rarely 1 or 2 terete like the stem.

* Leaves wanting.

† Capsule conspicuously longer than the perianth, ovoid-trigonous.

Stems very tall and stout, 2–5 ft. \times $\frac{1}{8}$ – $\frac{1}{4}$ in. Flowers distinct in the cyme, not collected into separate groups.

Stamens usually 6 1. *J. pallidus*.

Stems very slender, 9–24 in. \times $\frac{1}{25}$ – $\frac{1}{10}$ in. Cyme lax, flowers not very numerous, distinct in the cyme. Stamens 6–3

2. *J. pauciflorus*.

†† Capsule equalling the perianth or very slightly exceeding it.

- Stems rather stout, 2-4 ft. $\times \frac{1}{10}$ - $\frac{1}{8}$ in. Flowers $\frac{1}{10}$ - $\frac{1}{8}$ in., collected into many-flowered globose heads. Stamens usually 3. Capsule broadly oblong 3. *J. vaginatus*.
 Stems slender, 1-3 ft. $\times \frac{1}{20}$ - $\frac{1}{8}$ in. Flowers $\frac{1}{12}$ - $\frac{1}{10}$ in., usually in the cyme. Stamens 3. Capsule small, thin, almost globose 4. *J. effusus*.

** Leaves 1 or 2, terete like the stem.

- Tall salt-marsh plant, 1-3 ft. Cyme large, many-flowered. Stamens 6. Capsule ovoid-trigynous 5. *J. maritimus*.

B. Graminifolii. Stem leafy at the base and sometimes upwards as well. Leaves flat or semiterete, not septate within.

- Annual, much branched. Leaves setaceous. Flowers pale, distinct 6. *J. bufonius*.
 Perennial, simple. Leaves grassy, flat or involute. Cyme terminal, lax. Flowers pale, distinct 7. *J. tenuis*.
 Tall, 6-18 in. Leaves flat, all radical. Flowers brown, in distinct clusters. Stamens 3 8. *J. planifolius*.
 Tall, 6-18 in. Leaves flat or involute, all radical. Flowers brown, in distinct clusters, contracted (in the N.Z. form) into a compound head. Stamens 6 9. *J. cæspiticius*.
 Small, 1-4 in. Leaves all radical, almost terete. Flowers brown, in a terminal 2-8-flowered head 10. *J. antarcticus*.

Articulati. Stem leafy at the base and often upwards as well. Leaves terete or compressed, septate within, the septa usually prominent externally.

- Stems 9-24 in., compressed, 2-edged. Leaves $\frac{1}{10}$ - $\frac{1}{8}$ in. across, flat, multitubular. Cyme very large and compound; flowers brown. Stamens 3 11. *J. prismatocarpus*.
 Stems 6-18 in. Leaves linear, overtopping the stems, terete or slightly compressed, unitubular. Cymes small, contracted; flowers greenish. Stamens 6 12. *J. holoschænus*.
 Stems very slender, 6-18 in. Leaves linear-subulate, shorter than the stems, terete or compressed, unitubular. Cymes divaricate; flowers brown. Stamens 6 13. *J. lampocarpus*.
 Stems much branched, 2-8 in. Leaves narrow, compressed. Flowers pale, in 3-8-flowered fascicles. Capsule pale, equalling or slightly longer than the perianth 14. *J. scheuchzerioides*.
 Stems much branched, 1-6 in. Leaves filiform, terete. Flowers brown, in 2-5-flowered fascicles. Capsule dark-brown or black, much exceeding the perianth 15. *J. novæ-zealandiæ*.
 Stems much-branched, 1-6 in. Leaves filiform, terete. Flowers pale, in 2-3-flowered fascicles. Capsule pale, slightly exceeding the perianth 16. *J. pusillus*.

1. *J. pallidus*, *R. Br. Prodr.* 258.—Pale greyish-green, densely tufted, very tall and robust, 2-5 ft. high. Rhizome short, very stout and woody. Stems often $\frac{1}{4}$ in. diam., cylindric, finely striate, with several large and lax sheathing scales at the base, which are usually dark-chestnut below, straw-coloured above, sometimes pale through-

out; pith continuous, not irregularly interrupted. Inflorescence lateral; cymes large, much branched, effuse or contracted; branches unequal in length. Flowers $\frac{1}{8}$ in. long, pale, distinct or crowded on the ultimate branches of the cyme, in some forms almost secund. Perianth-segments lanceolate or ovate-lanceolate, acute, rather rigid, pale, the 3 inner slightly smaller than the outer. Stamens 6. Capsule exceeding the perianth, ovoid-trigonal, obtuse, pale, shining, incompletely 3-celled. Seeds very minute, ferruginous, obliquely oblong, tipped with a white point.—*Benth. Fl. Austral.* vii. 130; *Buchen. Monog. Junc.* 237. *J. vaginatus*, *Hook. f. Fl. Nov. Zel.* i. 263, and *Handb. N.Z. Fl.* 289 (not of *R. Br.*). *J. macrostigma*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 253.

Var. **triandrus**.—Similar to the typical form in size and habit, but the pith interrupted with irregular cavities, stamens 3 only, and capsule smaller and blunter, more oblong in shape.

NORTH AND SOUTH ISLANDS: Damp places from the Auckland Isthmus southwards, not common. Sea-level to 2000 ft. December–February. Var. *triandrus*: Vicinity of Auckland, *T. F. C.*; Paterson's Inlet, Stewart Island, *D. Petrie*!

A common Australian plant. It is without doubt the *Juncus tenax* var *major* of the Banks and Solander MSS., as pointed out by Mr. Rendle (*Journ. Bot.* xxxviii. (1900) 80); but Brown's name is the earliest accompanied by a sufficient description. The typical state is easily recognised by its large size, the six stamens, and the ovoid-trigonal capsule considerably exceeding the perianth.

2. **J. pauciflorus**, *R. Br. Prodr.* 259.—Usually very slender, 9–24 in. high. Rhizome short, horizontal, creeping. Stems densely crowded on the rhizome, $\frac{1}{25}$ – $\frac{1}{10}$ in. diam., erect, terete, wiry, smooth or finely striate; pith continuous or interrupted; basal scales closely appressed, usually red-brown, smooth and shining below, strongly grooved above. Inflorescence lateral; cymes lax, irregularly compound; branches few, slender, spreading. Flowers not nearly so numerous as in the allied species and sometimes very few, distinct, about $\frac{1}{10}$ in. long, pale or dark-chestnut. Perianth-segments equal or the outer rather longer, lanceolate or ovate-lanceolate, acute or the inner obtuse, margins broad, membranous. Stamens 6 or 3. Capsule exceeding the perianth, ovoid-trigonal, obtuse or shortly pointed, shining, stramineous to chestnut-brown, incompletely 3-celled. Seeds minute, obliquely obovoid, ferruginous, apiculate.—*Benth. Fl. Austral.* vii. 129; *Kirk in Trans. N.Z. Inst.* xiv. (1882) 384; *Buchen. Monog. Junc.* 238.

NORTH AND SOUTH ISLANDS: Not uncommon in wet places throughout. Sea-level to 2500 ft. December–February.

Also in Australia, where it ranges from Queensland to Tasmania. In its usual state distinguished without much difficulty by the small size, very slender stems, lax few-flowered inflorescence, and ovoid-trigonal capsule dis-

tinctly longer than the perianth, but specimens with a closer many-flowered inflorescence cannot be separated from *J. effusus* in the absence of ripe fruit. Buchenau's var. *Gunnii* appears to be a mere form differing slightly in the darker-coloured basal sheaths and flowers, and slightly longer capsule.

3. *J. vaginatus*, *R. Br. Prodr.* 258.—Very densely tufted, rather stout, 2–3 ft. high or even more. Rhizome stout, woody, creeping. Stems very closely packed on the rhizome, $\frac{1}{12}$ – $\frac{1}{6}$ in. diam., strict, erect, terete, finely striate; pith interrupted with irregular cavities; basal sheaths large, rather lax, smooth and shining and dark red-brown at the base, pale straw-coloured and distinctly grooved above. Inflorescence lateral, large, branched; the branches few or many, stiff, erect, rather close together, bearing distinct compact globose many-flowered heads. Flowers $\frac{1}{10}$ – $\frac{1}{8}$ in. long, pale-brown. Perianth-segments lanceolate, acute, stramineous, the inner ones rather shorter than the outer. Stamens usually 3, rarely 6. Capsule equalling the perianth or only very slightly exceeding it, broadly oblong, obscurely trigonous, obtuse at the tip.—*Benth. Fl. Austral.* vii. 129; *Buchen. in Engl. Bot. Jahr.* xxi. (1895) 264. *J. australis*, *Hook. f. Fl. Tasm.* ii. 66, t. 13A; *Handb. N.Z. Fl.* 289.

NORTH AND SOUTH ISLANDS: Marshy places from the North Cape to Banks Peninsula, not uncommon. December–February.

In referring Hooker's *J. australis* to the Australian *J. vaginatus* I have followed Buchenau's recent memoir on the Australian *Junci Genuini* (*Engl. Bot. Jahr.* 1895), and the opinion expressed by Mr. Rendle (*Journ. Bot.* 1900, 81). The New Zealand plant can generally be separated from *J. effusus* (*polyanthemus*, Buchen.) by the larger size, by the inflorescence being split up into distinct little rounded cymes or groups of flowers, and by the larger and rather narrower capsule; but some states are difficult to place. Smaller and more slender forms show an approach to *J. pauciflorus*, but the capsule of that species usually much exceeds the perianth.

4. *J. effusus*, *Linn. Sp. Plant.* 326.—Pale or brownish-green, very densely tufted, 1–3 ft. high. Rhizome short, stout, horizontal. Stems crowded on the rhizome, $\frac{1}{20}$ – $\frac{1}{8}$ in. diam., erect, soft or stiff and wiry, terete, finely striate; pith continuous or interrupted; basal sheaths appressed, opaque, smooth below, grooved above. Inflorescence lateral; cymes lax or rather dense, much branched; branches slender, unequal, often curved. Flowers numerous, small, $\frac{1}{12}$ – $\frac{1}{10}$ in. long, green or pale-chestnut, usually scattered along the branches of the cyme, rarely collected into separate groups. Perianth-segments equal or the outer rather longer, linear-lanceolate, acute, thin, margins membranous, scarious. Stamens 3, much shorter than the segments; anthers linear. Capsule about equaling the perianth, broadly oblong or obovoid, obscurely trigonous, obtuse or almost retuse at the tip, thin, shining, pale ferruginous or stramineous. Seeds numerous, obliquely obovoid, apiculate, pale ferruginous.—*Hook. f. Fl. Nov. Zel.* i. 263 (*in part*); *Buchen.*

Monog. Junc. 228. *J. communis*, *E. Mey. Junc.* 12; *Benth. Fl. Austral.* vii. 128; *Hook. f. Handb. N.Z. Fl.* 290. *J. luxurians*, *Col. in Trans. N.Z. Inst.* xix. (1887) 269. *J. polyanthemus*, *Buchen. in Engl. Bot. Jahr.* xxi. (1895) 261.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in damp places throughout. Sea-level to 3000 ft. *Wiwi.* November–February.

Under the name of *J. effusus* I have for the present placed several forms which, though not exactly agreeing with the typical *J. effusus*, appear to be too close to it to be considered as distinct species. One of these has the tall soft stems with continuous pith, lax pale inflorescence, and small broadly obovoid almost retuse capsule of the typical state, and to my mind cannot possibly be separated from it. A second and most abundant variety has more slender rigid and wiry stems, with interrupted pith, and the capsule is rounded and imperfectly 3-celled. This I take to be the *J. polyanthemus* of Buchenau. Closely allied to it is a still more slender form with the inflorescence split up into small rounded glomerules, almost after the fashion of *J. vaginatus (australis, Hook. f.)*, but differing altogether in habit and in the small capsule. Buchenau, in his monograph of the order, placed it under *J. pauciflorus* as var. *Cheesemanii*, although wanting the ovoid exserted capsule of that species. He now refers it to his *J. polyanthemus*. How far I am correct in merging the above, together with other less prominent varieties, under one species can only be determined by a leisurely and comprehensive study of the whole of the New Zealand forms, based upon more numerous specimens than have hitherto been collected, and checked by observations in the field. *J. effusus*, as ordinarily understood, is almost cosmopolitan in its distribution.

5. *J. maritimus*, *Lam. Encycl.* iii. 264; var. *australiensis*, *Buchen. Monog. Junc.* 257. — Densely tufted, tall, stout, dark-coloured, 1–3 ft. high. Rhizome short, thick, horizontal. Stems crowded on the rhizome, rigid, wiry, terete, pungent, furnished at the base with several chestnut-brown sheathing scales, the upper 1 or 2 of which are produced into terete leaves similar to the stems but shorter than them. Inflorescence lateral; cymes large, lax, irregularly branched; branches strict, erect. Flowers about $\frac{1}{2}$ in. long, dark chestnut-brown, usually aggregated into little clusters. Perianth-segments lanceolate, acute, the inner rather shorter. Stamens 6; anthers linear. Capsule ovoid-trigonus, acute, only slightly exceeding the perianth, dark chestnut-brown. Seeds obovoid, very shortly tailed.—*J. maritimus*, *A. Rich. Fl. Nouv. Zel.* 145; *A. Cunn. Precur.* n. 292; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 263; *Handb. N.Z. Fl.* 289.

NORTH AND SOUTH ISLANDS: Brackish-water marshes or sands from the North Cape to Banks Peninsula, abundant. Inland on the shores of Lake Rotorua, and by the Waikato River near Orakeikorako. December–January.

Also common on most parts of the Australian coast. It differs from the typical state of the species, which has a wide distribution in the north temperate zone, in the darker colour of the whole plant, in the smaller and more densely aggregated darker flowers, in the shorter capsule, and in the less evident tails to the seeds.

6. *J. bufonius*, *Linn. Sp. Plant.* 328.—Annual, pale-green, much branched from the base, often forming dense tufts, 3–12 in. high; roots fibrous. Leaves radical and cauline, very narrow-linear or almost filiform, sheathing at the base, flat or channelled above, grassy, setaceous, pith not jointed. Cyme large, occupying the greater part of the stem; branches long or short, sometimes flexuous. Flowers $\frac{1}{8}$ – $\frac{1}{4}$ in. long, sessile or nearly so, solitary or in fascicles of 2–3; bracteoles broadly ovate, scarious, much shorter than the flowers. Perianth-segments lanceolate, acuminate, with broad scarious margins; the 3 inner rather shorter than the outer. Stamens usually 6, but sometimes 3 only in the terminal flowers. Capsule shorter than the erect perianth-segments, oblong, obtuse. Seeds numerous, minute, ovoid-oblong, obtuse, delicately lineolate.—*Hook. f. Fl. Nov. Zel.* i. 264; *Handb. N.Z. Fl.* 290; *Benth. Fl. Austral.* vii. 127; *Buchen. Monog. Junc.* 174.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: From the Three Kings Islands and the North Cape southwards, abundant. Sea level to 4000 ft. November–January.

Almost universally distributed in temperate climates.

7. *J. tenuis*, *Willd. Sp. Plant.* ii. 214.—A laxly tufted perennial, with a short rhizome and numerous wiry roots. Stems several in a tuft, slender, erect, wiry, terete, 9–18 in. high. Leaves few, mostly radical, usually shorter than the stem, very narrow-linear, grassy, flat or more generally involute or channelled; base sheathing, membranous. Cymes terminal, lax, much exceeded by the leafy filiform bracts. Flowers $\frac{1}{8}$ – $\frac{1}{6}$ in. long, pale-green, remote or clustered. Perianth-segments lanceolate, acuminate, slightly spreading in fruit. Stamens 6, about half the length of the perianth-segments; anthers ovate. Style very short. Capsule ovoid-trigonal or almost globose, obtuse or slightly retuse, rather shorter than the perianth-segments, pale stramineous. Seeds obliquely obovoid, minutely apiculate.—*Cheesem. in Trans. N.Z. Inst.* xi. (1879) 433; *Buchen. Monog. Junc.* 193. *J. involucratus*, *Kirk in Trans. N.Z. Inst.* ix. (1877) 550.

NORTH AND SOUTH ISLANDS: In various localities from Mongonui to Dunedin, not uncommon. Sea-level to 3000 ft. November–January.

An abundant North American plant, extending into some parts of South America, found also in western Europe, &c. It is a very doubtful native of New Zealand, and has certainly increased its range considerably of late years.

8. *J. planifolius*, *R. Br. Prodr.* 259.—Tufted, perfectly glabrous, 6–18 in. high. Roots many, long, fibrous. Leaves all radical, much shorter than the stems, numerous, flat and grassy, membranous, $\frac{1}{10}$ – $\frac{1}{4}$ in. broad, dilated at the base into long imbricating sheaths. Flowering stems or culms long, slender, naked, bearing at the top an irregularly umbellately branched compound cyme; bracts at the

base of the inflorescence usually 1 or 2, short, leafy, sometimes small and scarious. Flowers small, $\frac{1}{10}$ in. long, chestnut-brown, crowded in many-flowered heads at the ends of the branches of the cymes. Perianth-segments subequal or the outer rather shorter, oblong-lanceolate, acute. Stamens 3. Capsule equalling the perianth or very slightly longer than it, obovoid, trigonous, mucronate. Seeds numerous, minute, ovoid, very minutely reticulated.—*Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 263; *Handb. N.Z. Fl.* 290; *Benth. Fl. Austral.* vii. 125; *Buchen. Monog. Junc.* 433.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Abundant throughout. Sea-level to 3000 ft. November-January.

An abundant plant in Australia and Tasmania, also found in Chili.

9. *J. cæspiticius*, *E. Mey. in Lehm. Pl. Preiss.* ii. 47; var. *bracteatus*, *Buchen. Monog. Junc.* 439.—A tufted perennial 6–18 in. high; roots numerous, fibrous. Leaves all radical, much shorter than the stem, very numerous, grassy, erect, gradually tapering from a long and broad sheathing base to a long subulate acuminate point, margins involute. Flowering-stems long, slender, naked. Cyme contracted into a dense conglobate head $\frac{1}{2}$ – $1\frac{1}{2}$ in. diam.; bracts at the base 1–3, leafy, much exceeding the cyme. Flowers rather longer than in *J. planifolius*, about $\frac{1}{8}$ in. long, crowded in many-flowered fascicles. Perianth-segments unequal, the 3 outer distinctly shorter. Stamens 6, about half the length of the segments. Capsule equalling the perianth or slightly exceeding it, ovoid-trigonous, obtuse, mucronate. Seeds minute, but rather larger than in *J. planifolius*, ovoid, smooth or very indistinctly reticulated.—*Benth. Fl. Austral.* vii. 126.

NORTH AND SOUTH ISLANDS: From the Auckland Isthmus to Otago, rather local. November-January.

Closely allied to *J. planifolius*, with which it has been confounded by most New Zealand botanists. It can be distinguished by the narrower involute leaves, densely congested cymes, rather larger flowers, the stamens always 6 in number, and in the fewer and larger smoother seeds. The typical state, which is common in Australia, has the cyme laxly branched, with shorter bracts.

10. *J. antarcticus*, *Hook. f. Fl. Antarct.* i. 79, t. 46.—A small densely tufted perennial 1–4 in. high; roots long, fibrous. Leaves very numerous, all radical, equalling or shorter than the stems, suberect or curved, linear-subulate, flat towards the base, semiterete or obscurely canaliculate above, cylindric towards the apex, obtuse, pith not jointed within; sheathing base long, broad, margins scarious. Stem terete, smooth, naked, terminating in a 2–8-flowered head, rarely a second head is produced lower down. Bracts ovate, membranous, rarely longer than the flowers. Flowers crowded,

about $\frac{1}{8}$ in. long, dark chestnut-brown. Perianth-segments equal, lanceolate, acute. Stamens 3, rarely 6; anthers ovate. Capsule equalling the perianth, ovoid-trigonus, subacute. Seeds ovoid, obtuse, shining, obsoletely reticulate.—*Handb. N.Z. Fl.* 290; *Buchen. Monog. Junc.* 432. *J. pauciflorus*, *Kirk in Trans. N.Z. Inst.* ix. (1877) 551 (not of *R. Br.*). *J. brevifolius*, *Kirk, l.c.* xiv. (1882) 382.

NORTH ISLAND: Rangipo Plain, near the foot of Ruapehu, *Petrie!* SOUTH ISLAND: Nelson—Mount Arthur, Mount Owen, *T. F. C.*; Lake Rotoiti, *Kirk!* Canterbury—Broken River, *J. D. Enys!* *Kirk!* *T. F. C.*; Tasman Valley, *T. F. C.* Otago—Not uncommon in the central and southern districts, *Buchanan!* *Petrie!* STEWART ISLAND: *Kirk!* AUCKLAND AND CAMPBELL ISLANDS: *Hooker, Kirk!* Usually from 1500–4000 ft., but descends to sea-level in Otago and the islands to the south. December–February.

A very distinct species. The Campbell Island plant is said to have 6 stamens and the culms hardly longer than the leaves, whereas in New Zealand the stamens are nearly always 3, and the culms usually (but not invariably) exceed the leaves. I agree with Professor Buchenau in considering *Kirk's J. brevifolius* to be a mere state of *J. antarcticus*.

11. ***J. prismatocarpus***, *R. Br. Prodr.* 259.—Perennial, laxly tufted. Stems erect or sometimes decumbent and rooting at the nodes towards the base, leafy, compressed, often 2-edged, not jointed, 9–24 in. high. Leaves always shorter than the stems, 3–9 in. long, $\frac{1}{2}$ – $\frac{1}{8}$ in. broad, gradually narrowed to an acute tip, strongly compressed, flat, soft, multitubular, incompletely and often indistinctly septate; sheathing base long, compressed, tip with 2 obtuse lobes. Cyme very large and compound, with 1 or 2 short leafy bracts at the base; branches long, slender, divaricating. Flowers $\frac{1}{8}$ – $\frac{1}{4}$ in. long, greenish or greenish-brown, in many-flowered globular clusters. Perianth-segments about equal, linear-lanceolate or subulate-lanceolate, acuminate. Stamens 3, much shorter than the segments. Capsule usually considerably longer than the perianth, pale, narrow, prismatic, triquetrous, 1-celled, placentas very feebly developed. Seeds ovoid, apiculate.—*Benth. Fl. Austral.* vii. 131 (in part); *Buchen. Monog. Junc.* 311.

NORTH ISLAND: Wet places in lowland stations from the Bay of Islands to Wellington, not uncommon. SOUTH ISLAND: Nelson—Motueka Valley, *T. F. C.* November–January.

Easily distinguished from *J. holoschœnus* by the strongly compressed stems, flattened and incompletely septate leaves, large spreading cymes, and by the stamens being 3 only. It is widely diffused in Australia and eastern Asia.

12. ***J. holoschœnus***, *R. Br. Prodr.* 259.—Stems laxly tufted, creeping at the base, strict and erect above, terete or subcompressed, smooth, leafy, 6–18 in. high. Leaves few, equalling or exceeding the stems, erect from a long sheathing base, tapering into a long acuminate point, terete or slightly compressed, fistular,

completely and distinctly septate. Cymes terminal, sparingly branched, more or less contracted, usually of 3-8 fascicles, rarely more; bract at the base long, foliaceous, usually overtopping the cyme. Flowers 10-20 in each fascicle, greenish, about $\frac{1}{8}$ in. long. Perianth-segments equal, lanceolate, acuminate. Stamens 6, about half the length of the perianth-segments. Capsule equalling the perianth or rather longer than it, narrow, prismatic, triquetrous, 1-celled, the placentas not very conspicuous inside the cells. Seeds ovoid-oblong, grooved and transversely rugose, apiculate at each end.—*Hook. f. Handb. N.Z. Fl.* 290; *Buchenan Monog. Junc.* 357. *J. prismatocarpus*, *Benth. Fl. Austral.* vii. 131 (*in part*). *J. cephalotes*, *Hook. f. Fl. Nov. Zel.* i. 263 (*not of Thunb.*).

NORTH ISLAND: Swamps from the Bay of Islands southwards to Wellington, not common. Sea-level to 2500 ft. November-February.

Also found in Australia and Tasmania. Bentham unites it with *J. prismatocarpus*, from which it appears to me to be abundantly distinct, as pointed out under that species.

13. *J. lampocarpus*, *Ehr. Calam.* n. 126.—Perennial, more or less densely tufted. Stems erect or ascending, rarely decumbent at the base, slender, terete or compressed, soft, leafy, 6-18 in. high. Leaves shorter than the stems, 3-9 in. long, $\frac{1}{20}$ – $\frac{1}{12}$ in. broad, linear-subulate, straight or curved, compressed or nearly terete, unitubular, strongly septate; sheathing base long and narrow, with 2 obtuse auricles at the tip. Cyme terminal, compound; branches slender, divaricate, bearing small 2-5-flowered heads at the tips and in the axils; lower bract much shorter than the cyme, leafy. Flowers small, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, chestnut-brown. Perianth-segments equal, lanceolate, acute. Stamens 6, much shorter than the segments. Capsule exceeding the perianth, narrow, pyramidal, triquetrous, mucronate, reddish-brown, glossy, 1-celled. Seeds obovoid, reticulate.—*Kirk in Trans. N.Z. Inst.* vii. (1876) 378; *Buchen. Monog. Junc.* 376.

NORTH AND SOUTH ISLANDS: From the Auckland Isthmus to Foveaux Strait, not uncommon in wet places. Sea-level to 3500 ft. November-February.

A common plant in many parts of the north temperate zone, but in the Southern Hemisphere apparently restricted to New Zealand. Perhaps not truly indigenous, although now widely spread, even in remote mountain districts.

14. *J. scheuchzerioides*, *Gaud. in Ann. Sci. Nat. Ser. i.* 5 (1825) 100.—Stems usually much branched below, often prostrate and rooting, 2-8 in. long or more, leafy throughout. Leaves strict, erect, 1-5 in. long, far exceeding the culms, narrow-linear, attenuated at the apex, compressed, striate, pale-green, soft and herbaceous, pith with transverse joints; sheathing base long and broad, mem-

branous, with 2 rounded auricles at the tip. Scape very short, much overtopped by the leaves, bearing 1 or 2 pale-coloured 3-8-flowered heads. Flowers crowded, $\frac{1}{8}$ in. long. Perianth-segments equal, lanceolate, acuminate, with scarious margins. Stamens 6, almost as long as the perianth-segments. Capsule equalling the perianth or rather longer than it, ovoid-trigonus. Seeds numerous, ovoid, obtuse, finely reticulated.—*Hook. f. Fl. Antarct. i.* 80; *Handb. N.Z. Fl.* 291; *Buchen. Monog. Junc.* 286.

SOUTH ISLAND: Otago—Lake district, alpine, *Hector* and *Buchanan* (*Handbook*). AUCKLAND AND CAMPBELL ISLANDS: In boggy places, *Hooker*. ANTIPODES ISLAND: *Kirk*!

I have seen no specimens but Mr. Kirk's, which have the habit of *J. novæ-zealandiæ*. Professor Buchenau appears to doubt the identity of the New Zealand plant with the South American *J. scheuchzerioides*, to which it was referred by Hooker. I have had no opportunity of comparing specimens.

15. *J. novæ-zealandiæ*, *Hook. f. Fl. Nov. Zel. i.* 264.—Stems very slender, much branched, densely tufted, often forming large patches, creeping and rooting at the base, erect above, 1-6 in. high. Leaves longer or shorter than the stem and sheathing it for the greater part of its length, very slender, filiform, terete, striate, pith with transverse joints; sheathing base long, membranous, with 2 rounded lobes at the tip. Flowers $\frac{1}{10}$ in. long, chestnut-brown, in 2-5-flowered fascicles; fascicles either solitary and terminal or 2-3 superposed. Perianth-segments ovate or ovate-lanceolate, obtuse, usually chestnut-brown, margins broad, membranous, hyaline. Stamens 6, equalling the perianth-segments or slightly exceeding them. Capsule $\frac{1}{8}$ - $\frac{1}{6}$ in. long, much longer than the perianth, broadly ovoid-trigonus, obtuse, shortly mucronate, dark chestnut-brown or almost black, smooth, shining. Seeds minute, ovoid, pale-brown; testa minutely reticulate.—*Handb. N.Z. Fl.* 291; *Buchen. Monog. Junc.* 289.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Mountain-swamps from the East Cape and Taranaki southwards, abundant. Sea-level to 4500 ft. December-March.

16. *J. pusillus*, *Buchen. in Abh. Nat. Ver. Bremen, vi.* (1879) 395.—Very similar to *J. novæ-zealandiæ* in habit and general appearance, but paler, rather smaller, and still more slender. Leaves longer or shorter than the stems, capillary, terete, striate, pith with transverse joints; sheaths thin and membranous, with hyaline margins and 2 rounded lobes at the top. Flowers pale-coloured, small, about $\frac{1}{12}$ in. long, solitary or in 2-3-flowered fascicles; fascicles seldom more than one. Perianth-segments lanceolate or ovate-lanceolate, acute or subacute, pale-green; margins membranous. Stamens 6, equalling the perianth-segments or rather longer. Capsule $\frac{1}{10}$ in. long, slightly exceeding the perianth, narrow ovoid-trigonus, shortly beaked, pale, smooth.

Seeds smaller and narrower than in *J. novæ-zealandiæ*.—*Buchen. Monog. Junc.* 290. *J. capillaceus*, *Hook. f. Fl. Nov. Zel.* i. 264; *Handb. N.Z. Fl.* 291; *Fl. Tasm.* ii. 65, t. 134B; *Benth. Fl. Austral.* vii. 132 (not of *Lamarck*).

NORTH AND SOUTH ISLANDS: Swampy places from the Bay of Plenty southwards, not so common as *J. novæ-zealandiæ*. Sea-level to 4000 ft. December–March.

I suspect that this will prove to be a variety of *J. novæ-zealandiæ*, from which there is little to separate it, except the smaller paler-coloured flowers and smaller and narrower capsule, which is often scarcely longer than the perianth. I have several states which appear to be quite intermediate. It is also found in south-eastern Australia and Tasmania.

3. LUZULA, D.C.

Perennial herbs, usually tufted. Leaves grass-like, mostly radical, more or less ciliate with long flexuous white hairs. Flowers small, crowded in small fascicles or placed singly, the fascicles or single flowers arranged in an irregularly branched simple or compound umbel or cyme, sometimes contracted into a globose or spiciform head, each flower with a bract and 2 bracteoles. Perianth-segments 6, glumaceous, distinct. Stamens 6, hypogynous or the 3 inner attached to the base of the segments; filaments filiform; anthers oblong or linear. Ovary sessile, 1-celled; style filiform, with 3 long stigmatic lobes; ovules 3, erect from a short basal placenta. Capsule 3-valved. Seeds 3, or fewer by abortion, globose or ovoid; testa minutely reticulated.

Species variously estimated from 30 to 50, most plentiful in the temperate portions of the Northern Hemisphere, also found on the mountains of the tropics. The Australian and New Zealand species are all very near to the protean *L. campestris*, and are so highly variable as to present an almost inextricable series of closely allied forms.

* Small, 1–2 in. high, forming compact cushion-shaped masses.

- | | |
|---|----------------------------|
| Stems much shorter than the leaves and concealed by them. Flowers pale | 1. <i>L. Colensoi</i> . |
| Stems about equalling the leaves. Inflorescence simple. Perianth-segments lanceolate, acute | 2. <i>L. micrantha</i> . |
| Stems exceeding the leaves. Inflorescence usually simple. Perianth-segments subulate, acuminate, dark-chestnut with very narrow margins | 3. <i>L. pumila</i> . |
| Stems exceeding the leaves. Inflorescence usually compound. Perianth-segments ovate-lanceolate, acuminate, with broad white margins | 4. <i>L. Cheesemanii</i> . |

** Stems often densely tufted but never forming cushion-shaped masses.

- | | |
|--|----------------------------|
| Small, slender, 1–4 in. high. Inflorescence a terminal solitary 3–8-flowered head. Stamens 3 | 5. <i>L. leptophylla</i> . |
| Variable in size, 4–18 in. Leaf-tip obtuse, often callous. Inflorescence lax or contracted, many-flowered | 6. <i>L. campestris</i> . |
| Usually from 6 to 14 in. Leaf-tip subulate, acute. Inflorescence of dense spikes congested into a pyramidal head | 7. <i>L. racemosa</i> . |

1. **L. Colensoi**, *Hook. f. Handb. N.Z. Fl.* 293.—Small, moss-like, densely tufted, nearly glabrous, forming rounded cushions 1–3 in. across. Stems very short. Leaves much longer than the stems, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, subulate, tapering from a broad sheathing base to an obtuse tip, rigid and coriaceous, channelled in front, convex on the back, glabrous above the middle, margins of the sheath and lower part of the leaf sparingly ciliate. Inflorescence of 2 to 6 few-flowered fascicles compacted into a dense head concealed among the leaves; lower bracts leafy, exceeding the flowers; remainder small, white, membranous, lacerate. Flowers about $\frac{1}{12}$ in. long. Perianth-segments equal, ovate-lanceolate, acute or subacute, chestnut-brown with pale membranous margins and tips. Stamens 6, from slightly shorter to slightly longer than the segments. Capsule almost equalling the perianth, ovoid-globose, trigonous, red-brown. Seeds ferruginous, obliquely ovoid.—*Buchen. Monog. Junc.* 145.

NORTH ISLAND: Mount Egmont, *T. F. C.*; Ruapehu, *H. Hill*! *Rev. F. H. Spencer*! Ruahine Mountains, *Colenso*! Mount Holdsworth, *W. Townson*! SOUTH ISLAND: Nelson Gordon's Nob, Mount Owen, Mount Peel, *T. F. C.* Westland—*Kelly's Hill*, *Petrie*! *Cockayne*! Otago—Longwood Range, *Kirk*! 4000–6000 ft. January–February.

Easily distinguished by its small size and very short stems, the flowers being sunk among the leaves. *Buchenau's* var. *macrostemon* (*Oesterr. Bot. Zeit.* 1898), separated on account of the stamens slightly exceeding the perianth, does not appear to me to be really distinct, the stamens often varying in length.

2. **L. micrantha**, *Buchen. in Oesterr. Bot. Zeit.* 1898.—Densely tufted, forming compact rounded patches. Stems rigid, erect, $\frac{1}{2}$ – $1\frac{1}{2}$ in. high, leafy at the base. Leaves equalling the stems, straight, rigid, erect, narrow-linear, obtuse at the tip, broadly sheathing at the base, flat or slightly concave in front, rounded or almost flat at the back; margins cartilaginous, glabrous; sheaths membranous, striate, slightly ciliate at the tip. Inflorescence simple, terminal, capitate, 3–8-flowered; the lowest bract (or the 2 lowest) foliaceous, overtopping the inflorescence, the remainder small, membranous, lacerate. Flowers about $\frac{1}{10}$ in. long. Perianth-segments equal, lanceolate, acute, reddish-brown, with very narrow hyaline margins. Stamens 6, rather more than half as long as the perianth-segments. Capsule elliptic-trigonous, almost equalling the perianth, acute, shining, red-brown, paler at the base.

Var. **triandra**.—Size and habit of the type, but leaves rather narrower, often curved, and usually canaliculate. Heads 6–12-flowered. Stamens 3.—*L. triandra*, *Buchen. l.c.*

Var. **crenulata**.—Very densely pulvinate. Leaves very narrow, subulate, canaliculate. Inflorescence 2–6-flowered. Perianth-segments crenulate at the tips. Stamens 6. Capsule obovoid, trigonous, obtuse.—*L. crenulata*, *Buchen. l.c.*

SOUTH ISLAND: Otago—Mount Cardrona, *Petrie*! Vars. *triandra* and *crenulata*: Rock and Pillar Range, *Petrie*! 4000–6000 ft. December–February.

The three plants united here under the name of *L. micrantha* are considered by Buchenau to represent three distinct species. I suspect that all are nothing more than depauperated short-stemmed forms of *L. pumila*.

3. *L. pumila*, Hook. f. *Handb. N.Z. Fl.* 293.—Small, densely tufted, forming small cushion-shaped masses. Stems slender, erect, 1–2 in. high. Leaves shorter than the stems, $\frac{1}{3}$ –1 in. long, linear-subulate, gradually narrowed to an obtuse tip, strict, erect, rigid, striate, channelled in front, convex behind, margins of the lower half and sheath sparingly ciliate. Inflorescence a dense terminal 4–10-flowered head; lowest bract foliaceous; the rest membranous, lacerate, pale chestnut-brown. Flowers about $\frac{1}{10}$ in. long, chestnut-brown. Perianth-segments subulate-lanceolate, long-acuminate, the 3 outer distinctly larger, dark-chestnut, without pale margins or with very indistinct ones. Stamens 6, about half as long as the perianth-segments. Capsule broadly obovoid, trigonous, from $\frac{1}{2}$ to $\frac{2}{3}$ the length of the perianth, dark chestnut-brown or almost black. Seeds oblong, minutely carunculate at the base.—*Buchen. Monog. Junc.* 144.

SOUTH ISLAND: Nelson—Mountains above the Wairau Gorge, *T. F. C.*; Mount Captain, *Kirk*! Canterbury—Mount Torlesse, *Haast*! *T. F. C.*; Craigieburn Mountains, *Cockayne*! Mount Darwin, *Haast*; Mount Dobson, *T. F. C.* Otago—Not uncommon on the central and western mountains, *Petrie*! 4000–6500 ft. January–February.

Best recognised by the stems distinctly overtopping the leaves, lanceolate-subulate perianth-segments, which are dark-chestnut with a very inconspicuous pale margin, and short almost black capsule.

4. *L. Cheesemanii*, *Buchen. Monog. Junc.* 146.—Small, densely tufted, forming compact patches. Stems slender, erect, 1–2 in. high. Leaves shorter than the stems or equalling them, $\frac{1}{2}$ –1½ in. long, linear-subulate, obtuse at the tip, rigid, concave in front, rounded on the back, grooved, margins ciliated throughout with long white hairs. Inflorescence of from 1 to 3 2–6-flowered fascicles congested into a terminal head; lowest bract leafy, often reddish, equalling the head; the remainder small, white, membranous. Flowers $\frac{1}{3}$ in. long. Perianth-segments about equal, ovate-lanceolate, acute, thin, with a blackish-chestnut stripe down the centre and very broad silvery-white margins. Stamens 6, about half as long as the perianth-segments. Capsule shorter than the perianth, ovoid-globose, trigonous, mucronate, dark chestnut-brown or almost black. Seeds obliquely ovoid, minutely carunculate at the base.

SOUTH ISLAND: Nelson—Summit of Gordon's Nob, *T. F. C.* Marlborough—Mount Mouatt, *Kirk*! Canterbury—Black Range, *T. F. C.*; Craigieburn Mountains, *Petrie*! Otago—Mount Kyeburn, Dunstan Mountains, *Petrie*! 4000–6000 ft. December–February.

Closely allied to *L. pumila*, from which it differs in the more compound inflorescence, and in the much broader perianth-segments, with very conspicuous silvery-white margins.

5. *L. leptophylla*, *Buchen. and Petrie in Oesterr. Bot. Zeit.* 1898.—Small, slender, stoloniferous, 1–4 in. high. Leaves all radical, much shorter than the stems, $\frac{1}{2}$ –2 in. long, very narrow, almost filiform, tip obtuse, margins convolute, glabrous or nearly so, mouth of the sheath with a tuft of slender hairs. Inflorescence terminal, of a single 3–8 flowered head, or more rarely the head consists of 2 closely compacted clusters; bract at the base of the head small, leafy. Flowers small, about $\frac{1}{12}$ in. long. Perianth-segments about equal or the outer a little shorter, ovate or ovate-lanceolate, acute, central portion dark chestnut-brown or almost black; margins broad, pale, membranous. Stamens 3, filaments filiform. Capsule equalling the perianth, rounded-obovoid, shining, dark-chestnut, sometimes almost black.

SOUTH ISLAND: Otago—Mount Kyeburn, *Petrie!* 2000–3500 ft. December–January.

A very curious little plant, of which I have seen no specimens except Mr. Petrie's. It appears to differ from reduced states of *L. campestris* in the exceedingly slender stems, almost filiform leaves, and 3 stamens.

6. *L. campestris*, *D.C. Fl. Fr.* iii. 161.—Excessively variable in all its parts. Stems more or less densely tufted, stout or slender, very variable in size, usually from 6–14 in. high, but often reduced to 2 in., and sometimes reaching 18 or 20 in. Leaves mostly radical, always shorter than the stems, generally flat and grassy, but varying in breadth from $\frac{1}{10}$ to $\frac{1}{3}$ in., gradually narrowed into an obtuse and usually callous tip; margins flat or thickened, more or less ciliate with long hairs and often copiously so. Inflorescence very variable, in the most developed forms of numerous clusters on the branches of an umbellate cyme, the branches very unequal in length; but frequently the clusters are greatly reduced in number and the branches are often so short that the inflorescence is congested into a pyramidal or ovoid entire or lobed head. Lower bracts foliaceous; upper membranous, entire or lacerate, more or less ciliate. Flowers $\frac{1}{10}$ – $\frac{1}{6}$ in. long. Perianth-segments ovate or ovate-lanceolate, acute, subequal, margins usually membranous, often white. Stamens 6. Capsule equalling the perianth, broadly ovoid or obovoid, trigonous, obtuse, usually shortly mucronate.—*Hook. f. Fl. Nov. Zel.* i. 264; *Handb. N.Z. Fl.* 292; *Benth. Fl. Austral.* vii. 123; *Buchen. Monog. Junc.* 155.

Var. *migrata*, *Buchen. in Oesterr. Bot. Zeit.* 1898.—Stems 4–15 in. high. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in. broad; margins flat, not usually cartilaginous, ciliate but not conspicuously so. Inflorescence well developed, usually lax, the lateral clusters pedunculate. Flowers $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Perianth-segments lanceolate, acute, dark chestnut-brown with white membranous margins.—*L. campestris* var. a, *Hook. f. Handb. N.Z. Fl.* 292. *L. rhadina*, *Buchen. l.c.* (a form with very narrow erect leaves).

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, from sea-level to 4500 ft.

Var. **Petriana**, *Buchen l.c.*—Rather stout, tufted, 4–12 in. high. Leaves narrow, $\frac{1}{15}$ – $\frac{1}{8}$ in. broad, sparingly ciliate. Inflorescence less developed, usually with the lateral clusters shortly stipitate, but sometimes contracted into a conglobate head. Upper bracts more or less lacerate. Perianth-segments lanceolate, acute, very dark chestnut-brown without white margins or with very obscure ones. Capsule shorter than the perianth. *L. Wettsteinii*, *Buchen l.c.*, appears to be a tall excessively slender state of this.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Abundant in hilly or mountain districts, ascending to 4500 ft.

Var. **picta**, *Hook. f. Handb. N.Z. Fl.* 292.—Slender, often flaccid, 3–18 in. high. Leaves flat, grassy. Inflorescence lax, the clusters rather few, the lateral ones peduncled. Flowers $\frac{1}{8}$ – $\frac{1}{4}$ in. long. Perianth-segments linear-lanceolate, long-acuminate, with very broad white membranous margins and a narrow stripe of dark or pale chestnut-brown down the middle. Capsule shorter than the perianth, obovoid, trigonous.—*L. picta*, *A. Rich. Fl. Nouv. Zel.* 146; *A. Cunn. Precur. n.* 295; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zeal. i.* 265; *Buchen. Monog. Junc.* 146. *L. subclavata*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 276.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, usually in shaded places. Sea-level to 3500 ft.

Var. **Banksiana**, *Buchen l.c.*—Rather stout, 3–12 in. high or more. Leaves numerous, broad, sometimes $\frac{1}{2}$ in. across, almost equalling the stem. Inflorescence congested into a conglobate head. Flowers large, $\frac{1}{2}$ in. long.—*L. Banksiana*, *E. Mey. in Linnæa*, xxii. (1849) 412. *L. picta* var. *Banksiana*, *Buchen. Monog. Junc.* 147.

Locality?—I am not acquainted with this, which is probably an intermediate form between *picta* and *australasica*.

Var. **australasica**, *Buchen l.c.*—Rather stout, 3–12 in. high or more. Leaves flat, coriaceous, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad; margins thickened, cartilaginous, conspicuously ciliate. Inflorescence contracted into an ovoid head $\frac{1}{4}$ – $\frac{3}{4}$ in. diam., often with several smaller lateral pedunculated heads. Upper bracts ciliate. Flowers about $\frac{1}{8}$ in. long. Perianth-segments lanceolate, acuminate, margins broad, white, membranous, central stripe chestnut-brown or red. Capsule ovoid-trigonous, slightly shorter than the perianth.—*L. australasica*, *Steud. Syn. Pl. Cyp.* 294. *L. Oldfieldii*, *Hook. f. Fl. Tasm.* ii. 68; *Handb. N.Z. Fl.* 293; *Benth. Fl. Austral.* vii. 122.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND: Hilly and mountain districts from Taupo southwards, ascending to 4000 ft.

Var. **crinita**, *Buchen l.c.*—Stout, strict, 3–14 in. high. Leaves numerous, flat or involute, $\frac{1}{12}$ – $\frac{1}{4}$ in. broad; margins thickened, densely and conspicuously ciliate. Inflorescence contracted into a compact ovoid head, sometimes with 1–3 smaller lateral peduncled ones. Lower bracts long, ciliate, involucrate; upper membranous, lacerate and densely ciliate. Flowers $\frac{1}{10}$ in. long. Perianth-segments lanceolate, long-acuminate, dark chestnut-brown, sometimes almost black. Capsule almost equalling the perianth.—*L. crinita*, *Hook. f. Fl. Antarct.* i. 84, t. 48; *Handb. N.Z. Fl.* 293; *Buchen. Monog. Junc.* 151.

AUCKLAND AND CAMPBELL ISLANDS, MACQUARIE ISLAND: Sea-level to 1400 ft. The typical form appears to be confined to the above localities, but intermediates between it and *australasica* and *migrata* are not uncommon in the mountains of the South Island.

L. campestris is widely distributed in temperate and montane districts in most parts of the world, and is everywhere excessively variable. In arranging the New Zealand forms I have mainly followed Buchenau's paper on "*Luzula campestris* and its Allied Species," printed in Oesterr. Bot. Zeitsch. 1898. It is necessary for the student to bear in mind that the characters given for the varieties are those of prominent forms only, that intermediates between all of them are plentiful, and that aberrant states are not uncommon.

7. *L. racemosa*, Desv. Journ. Bot. i. (1808) 162; var. **Traversii**, Buchen. Monog. Junc. 133.—Stems densely tufted, very variable in size, usually from 6 to 12 in., but sometimes attaining 18 in. and occasionally dwarfed to 4 in., slender, often attenuate above. Leaves radical and a few cauline, all much shorter than the stem, 1-6 in. long, rarely more, $\frac{1}{10}$ - $\frac{1}{4}$ in. broad at the base and from thence gradually tapering upwards, apex subulate, not obtuse as in the forms of *L. campestris*; margins flat or involute, ciliate with long hairs. Inflorescence terminal, erect or nodding, compound, of several short and dense spikes either all congested into an ovoid head, or the lower 1 to 3 distinct and sometimes peduncled. Lower bracts foliaceous, often overtopping the inflorescence; upper membranous, with very broad white margins and apices, densely ciliate with long hairs. Flowers small, $\frac{1}{10}$ in. long. Perianth-segments equal, or the outer slightly longer, lanceolate, awned, pale-chestnut with white and silvery margins. Stamens 3, rarely more. Capsule equalling the perianth, ovoid-globose, trigonous, mucronate, pale- or dark-chestnut, sometimes almost black. Seeds oblong-ovoid, ferruginous.

Var. **ulophylla**, Buchen. in Oesterr. Bot. Zeitsch. 1898.—Stems small, slender, 3-6 in. high, rarely more. Leaves very narrow, straight or curved, convolute, margins and backs densely covered with a scurfy coating of white woolly hairs. Heads ovoid-globose or cylindrical, small, $\frac{1}{4}$ - $\frac{1}{2}$ in. long; bracts pale. Capsule dark-chestnut.

SOUTH ISLAND: Nelson—Mountains above the Wairau Gorge, T. F. C. Marlborough—Mount Mouatt, Kirk! Canterbury—Broken River Basin and Upper Waimakariri, Kirk! T. F. C., Cockayne! Mount Cook district, T. F. C. Otago—Mount Pisa, Mount Kyeburn, Old Man Range, Mount Ida, Petrie! Mount Earnslaw, Cockayne! Var. *ulophylla*: Clarence Valley, T. F. C.; Castle Hill, Cockayne! Lake Wanaka, Petrie! 2000-5500 ft. December-February.

Probably an abundant mountain-plant, but it is often confounded with varieties of *L. campestris* with congested inflorescence. From all these it can be readily distinguished by the tapering leaves ending in an acute subulate point quite unlike the obtuse and often swollen leaf-tip of *L. campestris*; also by the spiciform clusters, and by the broad bracts with white membranous margins densely ciliate with long hairs. Buchenau's var. *ulophylla* appears to me to be quite as distinct as many species generally accepted by authors, and I am not acquainted with any intermediate forms. But the genus is so overloaded with synonymy that I leave it as it is for the present. The typical state of the species extends along the Andes from Mexico to Chili.

ORDER LXXXIV. **PALMÆ.**

Woody plants, usually with an erect stem bearing a terminal crown of large pinnate or fan-shaped leaves, rarely climbing or decumbent. Flowers regular, hermaphrodite or unisexual, small, numerous, arranged in spikes or panicles called spadices, which are enclosed when young within a large and broad deciduous bract called a spathe. Perianth inferior, coriaceous, persistent, of 6 segments in 2 series; the outer imbricate, often united into a 3-toothed or -lobed cup; the inner usually valvate. Stamens generally 6 or 3, rarely more, inserted at the base of the perianth; filaments free or connate, subulate or filiform; anthers versatile. Ovary superior, 1- or 3-celled, or of 3 distinct carpels; style very short or wanting; stigmas 3, sessile; ovules solitary (rarely 2) in each cell. Fruit a drupe or berry; exocarp thick, spongy, fleshy, or fibrous; endocarp membranous or crustaceous or bony. Seed with copious horny cartilaginous or oily albumen; embryo small, in a cavity near the surface of the albumen.

A majestic order, comprising nearly 130 genera and about 1100 species, almost wholly confined to tropical or warm extratropical regions, a few only found in northern or southern temperate latitudes. Few families are more generally useful, or applied to a greater variety of purposes. The timber, the foliage, the fruit, the starchy pith, and the fermentable sap are all employed. The cocoanut, date, sago-palm, cabbage-palm, betel-palm, African oil-palm, &c., are some of the best known species. The single genus found in New Zealand also occurs in Norfolk Island.

1. **RHOPALOSTYLIS**, Wendl. and Drude.

Stem tall, erect, marked with annulate scars. Leaves in a terminal crown, pinnately divided; segments numerous, equidistant, narrow-ensiform, acuminate, midrib stout, margins recurved towards the base. Inflorescence at the base of the leaves, of a much and densely branched spadix enclosed within two boat-shaped spathes. Flowers monœcious, the males and females on the same spadix, densely crowded, sessile, usually in threes, a female in the centre with a male on each side of it. Male flowers: Sepals subulate-lanceolate. Petals rather larger, obliquely ovate, acuminate, valvate. Stamens 6; filaments subulate, inflexed at the tips; anthers linear-oblong, dorsifixed, versatile. Rudimentary ovary columnar. Female flowers: Smaller and broader than the males, almost globose. Sepals rounded, concave, imbricating. Petals smaller. Ovary ovoid, 1-celled; stigma sessile, 3-fid; ovule parietal. Drupe ellipsoid or nearly globose; exocarp fleshy and succulent; endocarp fibrous within. Seed erect; albumen smooth, not ruminated; embryo basilar.

A genus consisting of the two following species, confined to New Zealand, Norfolk Island, and the Kermadec Islands.

Trunk rather slender, 10-30 ft.	Drupe oblong ..	..	1. <i>R. sapida</i> .
Trunk stout, 20-50 ft.	Drupe globose ..	..	2. <i>R. Baueri</i> .

1. *R. sapida*, *Wendl. and Drude in Kerch. Palm.* 255.—Stem rather slender, smooth, 10–25 ft. high, 6–9 in. diam., rarely more. Leaves 4–8 ft. long; rhachis clothed with copious lepidote scales; leaflets very numerous, 2–3 ft. long or more, 1–2 in. broad, linear-ensiform, midrib and main veins covered with lepidote scales; margins replicate at the base. Spadix 1–2 ft. long, much and closely branched, glabrous; spathes 2 or 3. Flowers very densely crowded, purplish-lilac. Drupe $\frac{1}{2}$ in. long, elliptic-oblong, bright-red.—*Areca sapida*, *Soland. ex Forst. f. Pl. Escul.* 66; *A. Rich. Fl. Nouv. Zel.* 157; *A. Cunn. Precur.* n. 298; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 262, t. 59, 60; *Handb. N.Z. Fl.* 288; *Bot. Mag.* t. 5139. *Kentia sapida*, *Mart. Hist. Nat. Palm.* iii. 312.

NORTH ISLAND: Abundant in forests throughout. SOUTH ISLAND: In low land districts not far from the coast as far south as Banks Peninsula and Hokitika, rare and local. CHATHAM ISLANDS: *F. A. D. Cox!* Sea-level to 2000 ft. *Nikau.* January–April.

The nikau-palm, so well known to all residents in the northern half of the colony, is of special interest as being the most southern member of its order. The unexpanded central bud and the very young spadix are both edible, and were formerly eaten by the Maoris, and even by European settlers. Branched specimens are occasionally seen; a very remarkable one with no less than 11 branches has been described and figured by Mr. Percy Smith (*Trans. N.Z. Inst.* x. 357, t. 15). Mr. Cockayne refers the Chatham Islands plant to the following species, but fruiting specimens sent to me by Mr. F. A. D. Cox have the elliptic-oblong drupe of *R. sapida*, and not the globose one of *R. Baueri*.

2. *R. Baueri*, *Wendl. and Drude in Bot. Zeit.* xxxv. (1877) 638.—Very closely allied to the preceding species, but larger and stouter, sometimes attaining a height of 50 ft. with a trunk over 12 in. diam. Leaves larger and more numerous; segments usually longer and broader. Inflorescence larger, the spadices said to be sometimes 3 ft. in length. Drupe altogether different in shape, globose or nearly so, $\frac{1}{2}$ – $\frac{2}{3}$ in. diam.—*Kentia Baueri*, *Seem. Fl. Vit.* 269; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 174. *Areca Baueri*, *Hook. f. in Illustr. Hort.* xv. (1868) 575; *Bot. Mag.* t. 5735. *A. sapida*, *Endl. Prodr. Fl. Norfolc.* 26 (*not of Soland.*).

KERMADEC ISLANDS: Sunday Island, abundant from sea-level to the tops of the hills, alt. 1500 ft., *T. F. C.* CHATHAM ISLANDS (?): *Index Kewensis*, iv. 713.

Originally discovered in Norfolk Island, and supposed by Endlicher to be the same as the New Zealand species, from which it is easily distinguished by the larger size and globose fruit. It is stated to be found in the Chatham Islands in the "*Index Kewensis*," but I have seen no specimens from thence.

ORDER LXXXV. PANDANEÆ.

Trees or shrubs or climbers, frequently with aerial roots. Leaves usually long and narrow, acuminate, sheathing at the base, coriaceous, keeled, margins and keel spinulose-serrate. Flowers dicecious, both sexes densely crowded on simple or branched

spadices protected by leafy spathes. Perianth wanting. Male flowers: Stamens numerous; filaments all distinct or connate in clusters; anthers erect, basifixed, 2-celled. Rudimentary ovary present or absent. Female flowers: Staminodia small or wanting. Ovary 1-celled, free or connate with those of adjoining flowers; stigma nearly sessile, papillose; ovules either solitary and basal, or numerous and attached to parietal placentas. Fruit an oblong or globose mass of densely compacted free or connate tough or fleshy drupes. Seeds solitary or many in each drupe; testa striated; albumen hard and fleshy; embryo minute.

A small order of 3 genera and about 160 species; most abundant in the islands of eastern tropical Africa and the Malay Archipelago, extending southwards to Australia, the Pacific islands, and New Zealand; not known in a native state in America. The leaves of most of the species are used for mat-making, thatching, &c., and would probably be useful for the manufacture of paper. The New Zealand genus extends as far north as Malacca.

1. FREYCINETIA, Gaud.

Climbing or scrambling shrubs. Stems often very long, branched, rooting. Leaves long, linear, sheathing at the base, keeled, entire or more usually serrulate. Spadices terminal, fascicled, sessile or pedunculate, enclosed within foliaceous bracts with fleshy and often coloured bases. Male flowers numerous, each one consisting of several stamens surrounding a rudimentary ovary; filaments short; anthers oblong. Female flowers of many 1-celled ovaries densely packed on the rhachis of the spadix, cohering at their bases, each ovary surrounded by minute staminodia, apex broad, truncate, crenulate; placentas 2 or more; ovules numerous, in 2 series on each placenta. Fruit an oblong mass of more or less fleshy or almost woody drupes. Seeds numerous, fusiform or ellipsoid; testa crustaceous or membranous; albumen copious; embryo basilar.

A genus of over 50 species, scattered through Malaya, the Pacific islands, and Australia, with one species in New Zealand.

1. **F. Banksii**, *A. Cunn. Precur.* n. 320.—A lofty climber, often reaching the tops of tall trees, or scrambling over rocks or prostrate trunks; branches many, stout, rooting. Leaves numerous towards the tips of the branches, $1\frac{1}{2}$ –3 ft. long, $\frac{1}{2}$ –1 in. broad, linear-elongate, finely acuminate, broadly sheathing at the base, concave, coriaceous, nerved, margins and midrib minutely spinulose-serrate. Spadices fascicled at the tips of the branches, cylindrical, peduncled, 3–6 in. long, dioecious; bracts numerous, leafy, the innermost with white or pale-lilac thick and succulent bases. Filaments rather long, filiform. Ovaries very densely packed, about $\frac{1}{3}$ in. long, rather fleshy in fruit. Seeds small, linear-oblong; testa cellular.—*Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 237, t. 54, 55; *Handb. N.Z. Fl.* 275; *Bot. Mag.* t. 6028.

NORTH ISLAND: Abundant in forests from the North Cape to the East Cape and Taranaki, less plentiful from thence southwards to Wellington. **SOUTH ISLAND:** Lowland districts in Nelson and Marlborough, and along the West Coast from Collingwood to Okarito and Milford Sound, not common. Sea-level to 2500 ft. *Kiekie*; *Tawhara* (the edible bracts); *Ureure* (the fruit). September–November; ripe fruit in May.

The leaves are occasionally plaited into kits or baskets by the Maoris. The white fleshy bracts surrounding the spadices are sweet and sugary, with an aromatic flavour, and are often eaten; the fruit less commonly so. I have seen no description of *F. inclinans*, Benn. Pl. Jav. Rar. i. 32, said to be found in New Zealand.

ORDER LXXXVI. TYPHACEÆ.

Marsh or water plants, with creeping rhizomes, solid cylindrical stems, and long linear leaves sheathing at the base. Flowers minute, monœcious, densely crowded in globose or cylindric spikes or spadices, male spadices always uppermost. Perianth either wanting or of minute scales or hairs. Male flowers: Stamens 1–7; filaments slender, distinct or connate; anthers basifixed, erect, linear or oblong. Female flowers: Ovary superior, sessile or stalked, 1- or rarely 2-celled; styles as many as the cells, linear, persistent; stigma unilateral, papillose; ovules solitary. Fruit dry or spongy, indehiscent. Seed solitary, pendulous; albumen copious, fleshy or farinaceous; embryo terete, axile.

A small order, cosmopolitan in its distribution, consisting of the 2 genera found in New Zealand and from 20 to 25 species.

Flowers in dense cylindric spikes, the females enveloped in

soft downy hairs 1. *TYPHA*.

Flowers in globose heads. Perianth of linear scales .. 2. *SPARGANIUM*.

1. *TYPHA*, Linn.

Tall reed-like marsh or aquatic herbs. Leaves all radical, long, linear, erect, spongy. Flowers monœcious, densely crowded in a terminal cylindrical spike furnished with a few deciduous spathaceous bracts; spikes either continuous or separated into two distinct parts by a broad or narrow interval, the upper portion male, the lower female. Male flowers of 1–7 stamens intermixed with capillary membranous scales; filaments short or long, distinct or connate; anthers linear-oblong, basifixed, 4-celled, longitudinally dehiscent; connective produced at the tip. Female flowers with or without a linear-spathulate bracteole at the base. Ovary long-stalked, the stalk furnished with numerous silky hairs, 1-celled, narrowed into a slender style; stigma unilateral, linguiform or spathulate; ovule solitary, pendulous. Fruit very minute, fusiform or narrow-ovoid; pericarp membranous or coriaceous, at length laterally dehiscent. Seed the same shape as the pericarp; albumen farinaceous; embryo axile.

Species 9 or 10, spread over most temperate and tropical regions.

1. **T. angustifolia**, Linn. *Sp. Plant.* 971. — Very variable in stature, 3–8 ft. high or more. Leaves as long as the flowering-stems or sometimes exceeding them, rather narrow, $\frac{1}{5}$ – $\frac{1}{2}$ in. broad, rarely more, expanded at the base into a broad sheath often more than a foot in length, plano-convex or convex on both sides. Spike variable in length; male portion usually from 2 to 6 in. long, in some varieties contiguous to the female part, in others separated from it by an interval sometimes as much as 1 in. long, axis of the spike furnished with reddish-brown hairs mixed with the flowers; female portion 3–8 in. long, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad. Female flowers furnished at the base with a linear spatulate bracteole, the hairs on the pedicel of the ovary shorter than the stigma.—*A. Rich. Fl. Nouv. Zel.* 99; *A. Cunn. Precur.* n. 319; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 238; *Handb. N.Z. Fl.* 276. *T. latifolia*, *Forst. f. Prodr.* n. 336 (not of Linn.); *Hook. f. Handb. N.Z. Fl.* 772.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant in marshy places throughout. Sea-level to 2000 ft. *Bulrush*; *Raupo*. December–March.

Almost cosmopolitan. The Australian and New Zealand forms are placed by Graebner (*Das Pflanzenreich*, Heft 2) under var. *Brownii* (*T. Brownii*, Kunth) and var. *Muelleri* (*T. Muelleri*, Rohrb.). The first of these includes the larger and coarser states, with much of the habit of *T. latifolia*, and, like it, with the male and female spikes contiguous. It differs, however, from *T. latifolia* in the female flowers being bracteolate at the base. Var. *Muelleri* is smaller, and usually has the male and female spikes separated by a distinct interval.

The pollen was formerly collected by the Maoris, made into cakes with water, and then baked and eaten; the starchy rhizome was also used for food in times of scarcity. The leaves were employed for constructing the walls of their houses, or whares, and are still used for the same purpose.

2. SPARGANIUM, Linn.

Marsh or aquatic herbs. Rhizome creeping. Stems erect or floating, simple or the inflorescence alone branched. Leaves crowded at the base of the stem, distichous, linear-elongate, erect or floating, sheathing at the base. Flowers monœcious, crowded in superposed usually remotely placed globose heads subtended by leafy bracts; the upper heads male, the lower female. Perianth of 3–8 spatulate membranous scales. Male flowers: Stamens 2–3, rarely more; filaments long or short, distinct or variously connate; anthers linear-oblong, 4-celled, longitudinally dehiscent. Female flowers: Ovary sessile or nearly so, 1–2-celled, produced into 1–2 long or short styles; stigma unilateral; ovule solitary, pendulous. Fruit obovoid, spongy, tipped by the persistent style; endocarp bony. Seed with a membranous testa; albumen farinaceous; embryo axile.

A small genus, not uncommon in the north temperate zone. In the Southern Hemisphere its sole representative is the following species, which is found in both Australia and New Zealand.

1. *S. antipodum*, *Graebner in Allg. Bot. Zeitschr.* iv. (1899) 33. —Stems slender, erect, 1–2 ft. high. Leaves very long, the lower radical ones usually far surpassing the inflorescence, $\frac{1}{10}$ – $\frac{1}{5}$ in. broad, flattish above, acutely and prominently keeled beneath, tip acute, lower portion expanded into a long but rather narrow sheath. Inflorescence simple in small specimens, but usually with 1–3 slender flexuous branches bearing male heads alone or very rarely with a single female below the males; main rhachis with 2–4 distant female heads below, and 3–12 more closely placed male ones above; the lower portion of the inflorescence with long leafy bracts. Filaments of the male flowers long, considerably more than twice the length of the scales. Stigma narrow, elongate. Ripe fruit about $\frac{1}{6}$ in. long, broadly obovoid, mucronate with the short thick persistent style.—*S. angustifolium*, *R. Br. Prodr.* 338 (not of *Michx.*); *Benth. Fl. Austral.* vii. 160; *Col. in Trans. N.Z. Inst.* xvi. (1884) 339. *S. simplex*, *Hook. f. Fl. Nov. Zel.* i. 238, and *Handb. N.Z. Fl.* 277 (not of *Huds.*).

NORTH ISLAND: Watery places from the North Cape to Wellington, not uncommon. SOUTH ISLAND: Near Picton, *J. Rutland!* *Maru.* Decem-ber–March.

Also in Australia, from Queensland to Victoria. *S. subglobosum*, Morong in *Bull. Torrey Club*, xv. (1888) 76, t. 79, f. 1, said to have been collected at the Bay of Islands by the American Exploring Expedition, is probably the same, and, if so, Morong's name will take precedence.

ORDER LXXXVII. LEMNACEÆ.

Minute gregarious floating water-plants, without distinct stems or true leaves, consisting of green scale-like fronds free from one another or 2–3 cohering by their margins, either rootless or more generally giving off 1 or several capillary rootlets from the under-surface. Flowers very seldom produced, most minute, placed in clefts on the edges of the frond, or sunk on its surface, naked or enclosed in a spathe, usually a single female with 1 or 2 males by its side. Perianth wanting in both sexes. Male flower: Stamens 1 or 2; filaments short; anthers 1–2-celled. Female: Ovary sessile, 1-celled, narrowed into a short and stout style; stigma simple; ovules 1–7. Fruit a somewhat fleshy utricle, with 1 or several seeds; albumen fleshy or wanting; embryo straight, axile.

An order of 2 genera and 20 species, found in still waters in all countries, both temperate and tropical. It contains the smallest of all known flowering-plants, all of them being of exceedingly simple structure, and very seldom found in flower.

1. **LEMNA**, Linn.

Fronds proliferous from the sides near the base, with one or several delicate root-fibres descending from the under-surface. Flowers in marginal clefts of the fronds. Filaments slender; anthers didymous, 2-celled; pollen globose, muricate. Ovary with 1-7 ovules. Fruit a 1-7-seeded utricle. Seeds erect or horizontal; embryo conic or ovoid.

A small genus of 8 or 9 species, most of them of almost worldwide distribution. The two following are all that are positively known to occur in New Zealand, but others will probably be found.

Root single. Fronds broadly ovate, thin, almost flat on both surfaces. Ovule solitary	1. <i>L. minor</i> .
Root single. Fronds broadly ovate, thick, conspicuously tumid beneath. Ovules 2	2. <i>L. gibba</i> .

1. **L. minor**, Linn. *Sp. Plant.* 970.—Root solitary, the sheath at its base without appendages. Frond symmetrical, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, ovate or oblong, nearly flat on both surfaces, green above, paler beneath; young ones growing from one side but soon becoming disconnected. Spathe unequally 2-lipped. Stamens 2, appearing successively (each a distinct male flower). Style rather long. Seed horizontal, hemi-anatropal, albuminous.—*Hook. f. Fl. Nov. Zel.* i. 239; *Handb. N.Z. Fl.* 278; *Benth. Fl. Austral.* vii. 163; *Hegelm. Lemn.* 141, t. 9, 10.

NORTH AND SOUTH ISLANDS: Still waters, abundant throughout. Sea-level to 2000 ft. *Duckweed*. Almost cosmopolitan in its distribution.

2. **L. gibba**, Linn. *Sp. Plant.* 970.—Root solitary, the sheath at its base elongate, cylindric, rootcap acute. Frond symmetrical, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, thick and spongy, flat above, convex beneath; young ones growing from one side, but soon separating. Spathe sac-like. Stamens* 2. Ovules 2 or more. Utricle bursting transversely. Seeds erect, anatropous; albumen scanty or wanting.—*Hook. f. Fl. Nov. Zel.* i. 239; *Handb. N.Z. Fl.* 278; *Benth. Fl. Austral.* vii. 163; *Hegelm. Lemn.* 145, t. 11–13.

NORTH ISLAND: Poverty Bay, Colenso.

I have seen no New Zealand specimens of this species, which is almost as widely distributed as *L. minor*. It is recognised at a glance by the conspicuously tumid under-surface of the frond.

ORDER LXXXVIII. **NAIADACEÆ.**

Submerged or floating fresh-water or marine aquatic plants, or marsh herbs. Stems often elongated, slender, branched, jointed; sometimes short and almost wanting. Leaves very various, altogether submerged and translucent, or floating and opaque, or all radical, sheathing at the base; stipules wanting or interpetiolar,

connate and sheathing. Flowers small and inconspicuous, usually green, hermaphrodite or unisexual, variously arranged. Perianth either wanting, or of 3-6 inferior segments valvate in bud. Stamens 1-6, hypogynous; anthers basifixed, erect, 1-2-celled. Ovary superior, of 1-6 distinct or more or less connate carpels, each 1-celled with usually a single erect or pendulous ovule; style long or short, stigma various. Fruit of 1-6 indehiscent nutlets or utricles, rarely drupaceous. Seed solitary, testa membranous; albumen wanting; embryo straight or curved, radicle unusually large.

A small order, dispersed over the whole world in marshy places, ponds, lakes, rivers, &c., also including some widely spread marine plants. Genera 16, species estimated at 120. The order cannot be said to have any important properties or uses. With the exception of *Lepilena*, which is found elsewhere in Australia alone, all the New Zealand genera have a wide range in both temperate and tropical climates.

A. Flowers hermaphrodite. Perianth of 4-6 herbaceous segments.

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| Marsh plants with linear radical leaves. Flowers on erect scapes. Perianth-segments 6 | | 1. TRIGLOCHIN. |
| Aquatic plants with submerged or floating stems and leaves. Flowers in axillary or terminal spikes. Perianth-segments 4 | .. .. . | 2. POTAMOGETON. |

B. Flowers unisexual (except in Ruppia). Perianth wanting or minute and hyaline.

* Stems and leaves filiform, submerged.

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|---|---------|------------------|
| Flowers hermaphrodite, 2 or 3 on a peduncle greatly elongating in fruit. Perianth wanting. Stamens 2; anthers almost sessile | | 3. RUPPIA. |
| Flowers unisexual, axillary, nearly sessile. Perianth wanting or female small and hyaline. Stamen 1, filament slender | .. .. . | 4. ZANNICHELLIA. |
| Flowers unisexual, axillary, nearly sessile. Perianth of 3 hyaline scales. Stamens 3; anthers sessile, cohering by their backs into a columnar mass | .. .. . | 5. LEPILENA. |

** Stems creeping in sand or mud in salt water. Leaves ribbon-like, flat, nerved.

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| Flowers unisexual, enclosed in the membranous sheathing base of a floral leaf | | 6. ZOSTERA. |
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1. TRIGLOCHIN, Linn.

Perennial marsh herbs. Roots fibrous. Leaves all radical, filiform or rush-like, flat or terete. Scapes slender, naked, erect, bearing a raceme or spike of small green hermaphrodite flowers. Perianth-segments 3 or 6, herbaceous, concave, deciduous. Stamens 6, inserted on the base of the perianth-segments; filaments very short; anthers didymous, extrorse. Carpels 6, distinct or more or less connate; stigmas penicillate; ovules solitary in

each carpel, basilar, erect, anatropous. Fruit of 3 or 6 free or connate coriaceous nutlets separating from a central axis. Seeds erect, cylindric or ovoid, terete or compressed; testa membranous; embryo straight.

About 12 species are known, spread through most temperate or subtropical regions, but especially plentiful in Australia. Both the New Zealand species are widely distributed.

Triglochin is often regarded as forming (with 3 other small genera) a distinct order (*Juncaginaceæ*), but for the purposes of this work it appears most convenient to merge it with the *Naiadaceæ*.

Scape 3-10 in. high.	Fruit subglobose ..	..	..	1. <i>T. striatum</i> .
Scape 6-24 in. high.	Fruit clavate ..	..	..	2. <i>T. palustre</i> .

1. ***T. striatum***, *Ruiz and Pav. Fl. Per.* iii. 72; *var. filifolium*, *Buch. Index Crit.* (1868) 59.—Rhizome short, stoloniferous. Leaves numerous, very narrow-linear or almost filiform, semiterete, variable in length, shorter or rather longer than the scape. Scape 3-10 in. high; raceme usually occupying about one-half the length. Flowers numerous, shortly pedicelled, minute, about $\frac{1}{12}$ in. diam. Outer perianth-segments broadly ovate; inner smaller and narrower. Perfect stamens 3, at the base of the outer segments; three inner abortive, without pollen, sometimes altogether wanting. Fruit globose, $\frac{1}{10}$ in. diam., of 3 perfect carpels separating from a central axis and leaving 3 scale-like barren ones attached to it.—*Buchenau in Pflanzenreich*, Heft iv. 14. *T. striatum*, *Benth. Fl. Austral.* vii. 166. *T. triandrum*, *Michx. Fl. Bor. Am.* i. 208; *Hook. f. Fl. Nov. Zel.* i. 236; *Handb. N.Z. Fl.* 278. *T. flaccidum*, *A. Cunn. Precur.* n. 321; *Raoul, Choix*, 41. *T. filifolium*, *Sieb. ex Spreng. Syst.* iv. 142; *Hook. Ic. Plant.* 579.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout in marshes near the sea; also inland in various localities in the thermal-springs district from Te Aroha and Rotorua to Taupo and Tokaanu. October-January.

The New Zealand variety is also found in Australia, Tasmania, and Chili; the typical state ranges throughout almost the whole of North and South America, and also occurs in South Africa.

2. ***T. palustre***, *Linn. Sp. Plant.* 338.—Rhizome short, stoloniferous. Leaves all radical, much shorter than the scape, narrow-linear or filiform, semiterete, upper surface faintly grooved. Scape slender, 6-24 in. high; raceme elongating after flowering. Flowers numerous, shortly pedicelled, minute, green or greenish-purple. Perianth-segments ovate, all equal. Stamens 6, all fertile; anthers purple. Fruit appressed to the rhachis, linear-clavate, $\frac{1}{4}$ in. long; carpels 3, very slender, almost awned at the base, attached to the axis by the tip.—*Cheesem. in Trans. N.Z. Inst.* xiv. (1882) 300.

SOUTH ISLAND: Canterbury—Broken River, *J. D. Enys* and *T. F. C.*; Rangitata Valley, *Haast*! Lake Tekapo and Tasman Valley, *T. F. C.* Otago—Ophir, Black's, *Petrie*! 2000–3000 ft. December—January.

A plant with a wide distribution in the Northern Hemisphere, also found in extratropical South America, but not yet detected in Australia.

2. **POTAMOGETON**, Linn.

Perennial aquatic herbs. Stems slender, simple or branched. Leaves wholly submerged and translucent, or floating and opaque, alternate or opposite, entire or toothed; stipules intrafoliar, free, or adnate to the petiole or base of the leaf. Flowers small, green, hermaphrodite, ebracteate, sessile in a dense spike on an axillary peduncle arising from a membranous spathe. Perianth-segments 4, small, herbaceous, concave, valvate. Stamens 4, inserted at the base of the segments; anthers sessile, 2-celled, extrorse. Carpels 4, sessile, distinct, 1-celled; stigma oblique, decurrent; ovules solitary, affixed to the inner angle of the cell, campylotropous. Ripe carpels or drupelets 4, small, coriaceous or spongy, ovoid or subglobose, obtuse or beaked by the recurved persistent stigma, 1-seeded. Seed curved, reniform; testa membranous; embryo with a large radicle and narrow incurved cotyledon.

A genus widely spread in the fresh or brackish waters of almost all temperate or subtropical regions, more rare in the tropics. Species variously estimated at from 40 to 100 or more, according to the different views of authors, extremely variable, and most difficult of discrimination. The New Zealand forms have never been carefully sought for, and in all probability other species will be added to those described herein.

A. Floating leaves more or less coriaceous, with a broad long-petioled lamina, different in shape from the membranous submerged ones. Stipules free.

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| Floating leaves 2–4 in., biplicate at the base. Submerged leaves wanting or reduced to phyllodes. Fruit large, $\frac{1}{8}$ in. long, keeled on the back when dry | 1. <i>P. natans</i> . |
| Floating leaves 1–3 in., not plicate at the base. Submerged leaves few, linear-lanceolate. Fruit small, $\frac{1}{12}$ – $\frac{1}{10}$ in., rounded on the back | 2. <i>P. polygonifolius</i> . |
| Floating leaves $\frac{3}{4}$ –1 $\frac{3}{4}$ in. Submerged leaves numerous, 2–4 in. Fruit small, $\frac{1}{10}$ in., keeled on the back when dry | 3. <i>P. Cheesemanii</i> . |

B. Leaves all submerged and uniform, sessile, membranous.

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|--|---------------------------|
| Leaves 1–4 in. by $\frac{1}{8}$ – $\frac{1}{4}$ in., linear-ligulate, obtuse; stipules free, lacerate. Spike dense | 4. <i>P. ochreatus</i> . |
| Leaves 2–4 in. by $\frac{1}{10}$ – $\frac{1}{5}$ in., very narrow-linear or filiform; stipules adnate. Spike interrupted | 5. <i>P. pectinatus</i> . |

1. *P. natans*, Linn. *Sp. Plant.* 126. — Stems creeping below, long or short, simple or sparingly branched, terete. Floating leaves on long petioles; lamina 2–4 in. long, oblong or elliptic or elliptic-lanceolate, acute or subacute, subcordate and shortly biplicate at the base, coriaceous, 20–30-nerved with copious cross-veins and

minute areolation; stipules very long and conspicuous, 3-5 in., free, acuminate. Submerged leaves wanting or if present few and reduced to long and narrow phyllodes without any lamina. Peduncles stout, 2-4 in. long, bearing a dense-flowered spike $1\frac{1}{2}$ -2 in. long. Perianth-segments broadly rhomboidal. Fruit $\frac{1}{6}$ in. long, turgid, obliquely ovoid, keeled on the back when dry, beak short.—*Hook. f. Fl. Nov. Zeal.* i. 236; *Handb. N.Z. Fl.* 278; *Benth. Fl. Austral.* vii. 170 (in part); *A. Bennett in Journ. Bot.* xxv. (1887) 177.

NORTH AND SOUTH ISLANDS: Probably not uncommon.

A widely dispersed plant, found in nearly all temperate climates. Its exact distribution in New Zealand is not yet made out with certainty, as *P. Cheesemanii* has been recorded in mistake for it in many localities, but I have seen specimens from both Islands.

2. **P. polygonifolius**, *Pourr. in Mem. Acad. Toul.* iii. (1788) 325.—Stem creeping at the base, long or short, simple or sparingly branched. Floating leaves on long petioles; lamina 1-3 in. long, elliptic-oblong to lanceolate, acute or obtuse, rounded or subcordate or acute at the base, not plicate, thinly coriaceous; stipules much shorter than in *P. natans*, $1-1\frac{1}{2}$ in. long. Submerged leaves linear-lanceolate, acute. Peduncles variable in length, rather slender; spike dense-flowered, $\frac{3}{4}-1\frac{1}{2}$ in. long. Perianth-segments transversely elliptic. Fruit small, reddish, $\frac{1}{12}-\frac{1}{10}$ in. long, blunt and rounded on the back, not keeled, beak very short.—*Kirk in Trans. N.Z. Inst.* iii. (1871) 165.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Ponds and small streams from the North Cape southwards, not uncommon. Sea-level to 1500 ft. December-April.

Distinguished from *P. natans* by the smaller and more membranous leaves, much shorter stipules, slender peduncles, and much smaller fruit not keeled on the back when dry. Several of my specimens have been examined by Mr. A. Bennett, of Croydon, whose knowledge of the genus is unrivalled, and he informs me that their identity with *P. polygonifolius* cannot be questioned. The species is widely spread in Europe and Asia, and has been recorded from Australia.

3. **P. Cheesemanii**, *A. Bennett in Journ. Bot.* xxi. (1883) 66.—Stems slender, striated, long or short, simple or branched. Upper leaves alternate or opposite, long-petioled; lamina $\frac{3}{4}-1\frac{3}{4}$ in. long, elliptic-oblong to oblong or lanceolate, obtuse, rounded at the base, coriaceous, 10-16-nerved with numerous cross-veins and minute areolation; stipules broad, subacute. Submerged leaves numerous, usually alternate but sometimes opposite, shortly petioled, 2-4 in. long, $\frac{1}{4}-\frac{3}{4}$ in. broad, oblong-lanceolate to lanceolate or linear, very thin and membranous, translucent, 5-12-nerved with rather distant cross-veins, margins often undulate or crisped, not denticulate. Peduncles variable in length, rather slender; spike dense, $\frac{1}{2}-\frac{3}{4}$ in.

long. Perianth-segments rhombic-orbicular. Fruit small, about $\frac{1}{10}$ in. long, broadly ovoid, slightly compressed, keeled on the back, beak short.—*A. Bennett*, l.c. xxv. (1887) 177; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 410. *P. heterophyllus*, *Hook. f. Handb. N.Z. Fl.* 279, 742 (not of Schreber). *P. natans* var. *australis*, *Kirk ex A. Bennett in Journ. Bot.* xxv. (1887) 177.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout in streams, ponds, and lakes. Sea-level to 3000 ft. *Manihi*. November–March.

The most abundant species, universally distributed throughout the colony. The numerous submerged leaves and smaller floating ones at once separate it from *P. natans*, to say nothing of other differences. According to Mr. Bennett, it is also found in Tasmania.

4. *P. ochreatus*, *Raoul, Choix*, 13, t. 7.—Stems slender, striate, branched, long or short according to the depth of the water. Leaves all submerged, alternate or the upper opposite, sessile, 1–4 in. long, $\frac{3}{8}$ – $\frac{1}{4}$ in. broad, linear-ligulate, obtuse or emarginate at the tip, membranous, 3- or 5-nerved with or without finer parallel veins between, transverse veins few; stipules free, at length conspicuously lacerate. Peduncles stout, erect, usually shorter than the leaves, 1–3 in. long; spike short, oblong, about $\frac{1}{2}$ in. long. Fruit broadly obliquely ovoid, subcompressed, $\frac{1}{10}$ in. long, back rounded, beak short, thick.—*Hook. f. Fl. Nov. Zel.* i. 236, and ii. 336; *A. Bennett in Journ. Bot.* xxv. (1887) 178. *P. gramineus*, *Hook. f. Handb. N.Z. Fl.* 279 (not of Linn.). *P. obtusifolius*, *Benth. Fl. Austral.* vii. 172 (not of Mert. and Koch).

NORTH AND SOUTH ISLANDS: Rivers and lakes from the North Cape to Otago, not uncommon. November–March.

This is a much larger and stouter plant than the northern *P. obtusifolius*, to which it was referred by Bentham. It appears to be plentiful in Australia, ranging from Queensland to Tasmania.

5. *P. pectinatus*, *Linn. Sp. Plant.* 127.—Stems long, filiform, much branched, often forming dense masses. Leaves all submerged, alternate, sheathing at the base, 2–4 in. long by $\frac{1}{20}$ – $\frac{1}{15}$ in. broad, very narrow-linear or almost filiform, upper channelled on both surfaces, lower flatter, 1–3-nerved with transverse veinlets; stipules adnate with the sheathing base of the leaf. Peduncles long, slender, filiform, not thickened upwards; spike $1\frac{1}{2}$ –2 in. long, of distant whorls of flowers. Fruit rather large for the size of the plant, about $\frac{1}{8}$ in. long, turgid, obscurely keeled on the back, slightly convex in front, rugose when dry, beak very short.—*Hook. f. Fl. Nov. Zel.* ii. 336; *Handb. N.Z. Fl.* 279; *Benth. Fl. Austral.* vii. 173; *A. Bennett, Journ. Bot.* xxv. (1887) 178.

NORTH ISLAND: Auckland—Waikato River and Lake Whangape, *Kirk!* *T. F. C.*; Lakes Tarawera and Rotomahana, *Kirk!* Hawke's Bay—Tangoia Lagoon, *Colenso, A. Hamilton!* SOUTH ISLAND: Canterbury—Lake Forsyth, *Kirk!* Otago—Lake Waiholo, and still waters of the Taieri Plain, *Petrie!* December–March.

A very widely distributed plant, found in fresh or brackish waters in most parts of the world.

3. *RUPPIA*, Linn.

Slender submerged much-branched herbs, usually growing in brackish water. Leaves alternate or opposite, filiform, with broad sheathing bases. Flowers minute, hermaphrodite, 2 or more on a spike, at first enclosed in the membranous leaf-sheath, but after flowering the filiform peduncle elongates greatly, and is either straight or spirally coiled. Perianth wanting. Stamens 2, opposite; filaments very short; anthers 2-celled, the cells distinct, opening outwards. Carpels 4; stigma sessile, peltate; ovule solitary, pendulous from the apex of the cell. Fruiting carpels stipitate, obliquely ovoid, obtuse or beaked. Seed uncinat; testa membranous; embryo with a large thick radicle and small incurved cotyledon.

A genus of either one variable species or of several closely allied ones, common in brackish waters in almost all temperate or subtropical countries.

1. *R. maritima*, Linn. *Sp. Plant.* 127.—Stems slender, filiform, variable in length, 6–24 in., leafy throughout. Leaves 2–5 in. long, filiform, with broad membranous sheathing bases. Flowers 2–6 together, at first completely enclosed in the inflated leaf-sheath; but the spike gradually emerges, and is borne up to the surface of the water by the usually conspicuously spirally coiled peduncle. Ripe carpels $\frac{1}{10}$ – $\frac{1}{8}$ in. long, greenish, obliquely ovoid, beaked; each one on a slender stipes sometimes more than 1 in. long.—*Hook. f. Fl. Nov. Zel.* i. 236; *Handb. N.Z. Fl.* 279; *Benth. Fl. Austral.* vii. 174.

NORTH AND SOUTH ISLANDS: Abundant throughout in brackish-water ponds and lagoons, not so common in fresh-water lakes and streams. December–April.

All the specimens I have seen have spirally coiled peduncles and rather broad sheaths; but in all probability the variety (or species) *rostellata* will also be found, which has straight or flexuous peduncles and narrow leaf-sheaths.

4. *ZANNICHELLIA*, Linn.

Slender submerged water-plants; stems filiform, branched. Leaves usually opposite, filiform, sheathing at the base; sheaths stipular. Flowers minute, axillary, monœcious, a single male and female enclosed in the membranous leaf-sheaths. Male flower: Perianth wanting. Stamen 1; filament short at first, elongating as the flower expands; anther 2–3-celled, linear, basifixed,

cells dehiscing laterally, connective produced, apiculate. Female flower: Perianth short, cupular, hyaline. Carpels 2-6, sessile; styles long or short; stigma large, obliquely peltate, crenate; ovule solitary, pendulous, orthotropous. Ripe carpels usually 3 or 4, sessile or stalked, curved, oblong or oblong-reniform, slightly compressed, tubercled or crenate or smooth on the back, beaked by the projecting style. Seed pendulous; testa membranous; embryo cylindric, the cotyledonary end bent into a short coil.

An almost cosmopolitan genus of 4 or 5 closely allied species, probably all forms of one.

1. *Z. palustris*, Linn. *Sp. Plant.* 969. — Stems very slender, much branched, leafy throughout, often forming dense masses, 3-14 in. long. Leaves opposite or subwhorled, very slender, $\frac{1}{2}$ -3 in. long, filiform, flat. Flowers sessile or very shortly pedicelled. Fruiting carpels 3 or 4, about $\frac{1}{12}$ in. long, stipitate or almost sessile, curved, smooth or very obscurely crenate on the back; styles from half to almost as long as the carpels. — *Hook. f. Fl. Nov. Zel.* i. 237; *Handb. N.Z. Fl.* 280; *Kirk in Trans. N.Z. Inst.* xxviii. (1896) 498.

NORTH ISLAND: Auckland—Abundant in the Waikato River, from Taupiri downwards, also in Lakes Waikare, Whangape, and Waihi, *Kirk! T. F. C. Hawke's Bay—Tangoia Lagoon, Colenso!* SOUTH ISLAND: Otago—Waikouaiti Lagoon, *Petrie!* December-May.

The Waikato specimens have the carpels sessile or nearly so, and decidedly turgid; in those from Hawke's Bay and Otago they are distinctly stipitate, and with longer styles. Both forms have the back of the carpel smooth or nearly so.

5. *LEPILÆNA*, J. Drummond.

Very slender submerged water-plants; stems filiform, branched. Leaves alternate or the floral ones opposite, filiform, sheathing at the base; sheaths broad, stipular. Flowers minute, axillary, diœcious or rarely monœcious, solitary within the dilated sheathing bases of a pair of floral leaves. Male flowers shortly pedicelled. Perianth very minute, of 3 hyaline scales. Anthers 2 or 3, united by their backs and forming a solid column resembling a single anther; each anther 2-celled, dehiscing longitudinally. Female flowers sessile or shortly pedicellate. Perianth of 3 hyaline segments longer or shorter than the carpels. Carpels 3, distinct, sessile or shortly stipitate, narrowed into a short or long style; stigma oblong or spatulate; ovule solitary, pendulous. Ripe carpels usually 3, oblong, coriaceous, indehiscent, tipped by the persistent style. Seed oblong; testa membranous; embryo with a thick obtuse radicle and tapering involute cotyledonary end.

A small genus of 4 species, 3 of which are Australian, one of them said to extend to New Zealand; the remaining one is endemic in New Zealand. In Engler's "*Natürlichen Pflanzenfamilien*" the genus is merged with the Mediterranean *Aithenia*.

Leaf-sheaths narrow. Anthers 3, connate into a column.

Stigma oblong-clavate 1. *L. Preissii*.

Leaf-sheaths broad. Anthers 2 (or 1?). Stigma very

large, flat, deeply fimbriate 2. *L. bilocularis*.

1. *L. Preissii*, *F. Muell. Fragm. Phyt. Austral.* viii. 217.—Stems 6–18 in. long, very slender, filiform, branched, often forming dense masses. Leaves filiform or almost capillary; sheathing bases very narrow. Flowers diœcious; males solitary within the leaf-sheaths, shortly pedicelled. Perianth minute, cupular. Anthers 3, sessile within the perianth, connate by their backs into a columnar mass, each one 2-celled, cells dehiscing longitudinally. Female flowers solitary, shortly pedicelled. Perianth of 3 distinct segments, rather longer than the carpels. Carpels 3, narrowed into a rather long style; stigma oblong-clavate. Ripe carpels cylindrical, sessile or nearly so, about $\frac{1}{2}$ in. long.—*Benth. Fl. Austral.* vii. 180; *Kirk in Trans. N.Z. Inst.* x. (1878) App. xl., and xxviii. (1896) 499. *Zannichellia Preissii*, *Lehm. in Plant. Preiss.* ii. 3.

NORTH ISLAND: Auckland—Waikato River, near Churchill, *Kirk*.

I have seen no New Zealand specimens of this, but according to Mr. Kirk examples collected by him in the locality quoted above were submitted to the late Baron Mueller and by him identified with the Australian *L. Preissii*. It greatly resembles *Zannichellia palustris*, and in the absence of male flowers may have been mistaken for it.

2. *L. bilocularis*, *T. Kirk in Trans. N.Z. Inst.* xxviii. (1896) 500.—Stems filiform, much branched, 3–12 in. long. Leaves very narrow-linear or filiform, flat, 1-nerved, obtuse; base broad, expanded into a membranous sheath. Flowers very minute, solitary, diœcious, concealed in the leaf-sheaths. In the male plant the sheathing bases of the floral leaves are broad and much expanded, and conspicuously 2-lobed at the tip. Flowers very shortly pedicelled. Perianth of 3 most minute hyaline scales. Anthers apparently 2, cohering by their backs and resembling a single anther, each 2-celled, longitudinally dehiscent, connective produced. Floral leaves subtending the female flowers with narrower sheaths; flowers sessile or very shortly pedicelled. Perianth-segments 3, oblong, entire or 2-lobed, almost as long as the styles. Carpels 3, sessile; styles slender; stigmas very large and broad, deeply fimbriate or laciniate. Ripe carpels about $\frac{1}{15}$ in. long, slightly oblique, turgid, rounded on the back; style almost as long as the carpel.

SOUTH ISLAND: Canterbury—Streams flowing into the Selwyn River; near the outlet of Lake Ellesmere, *Kirk*! Otago—Lake Waiholā, Waikouaiti, Taieri Plain, *Petrie*!

A very curious little plant. Mr. Kirk describes the anthers as solitary; but in Mr. Petrie's Lake Waiholā specimens, which are the only males that I have seen, I make the anthers to be 2, placed back to back, but closely resembling a single 4-celled anther. At the same time it is not easy to satisfy one's-self as to the structure of the anther from an examination of dried specimens.

6. **ZOSTERA**, Linn.

Marine submerged plants. Rhizomes slender, branched, creeping and rooting at the nodes, often matted. Stems short, slender, leafy, compressed. Leaves distichous, alternate, narrow-linear, grass-like, 1-5-nerved, sheathing at the base; sheaths stipuliform, with inflexed margins. Flowers monœcious, the males and females placed alternately upon one face of a narrow spadix enclosed within the dilated membranous base of a leaf. Perianth wanting. Male flowers: Anther solitary, sessile, oblong, cylindric, curved, 1-celled, dehiscence longitudinal; pollen confervoid. Female flowers: Carpel solitary, laterally attached above the middle, narrowed into a short subulate style; stigmas 2, capillary; ovule pendulous from the apex of the cell. Ripe carpel oblong, membranous, bursting irregularly. Seed pendulous; testa membranous, often striated; embryo large, deeply grooved, the linear incurved cotyledonary end sunk in the groove.

Three or four closely allied species are known, found in shallow water on the shores of most temperate regions.

Leaves 3-9 in. \times $\frac{1}{16}$ - $\frac{1}{10}$ in., truncate or notched at the tip.

Spadix with transverse appendages, one folded over each
carpel

Leaves 9-18 in. \times $\frac{1}{16}$ - $\frac{1}{8}$ in., rounded at the tip 1. *Z. nana*.
.. .. . 2. *Z. tasmanica*.

1. ***Z. nana***, Roth, *Enum. Pl. Phæn. Germ.* i. 8.—Rhizomes slender, matted. Leaves 3-9 in. long, rarely more, $\frac{1}{16}$ - $\frac{1}{10}$ in. broad, narrow-linear, truncate or obscurely notched at the tip, with 3-5 faint parallel nerves on each side of the stout midrib and distant transverse veinlets, margins thickened. Floral sheaths or spathes $\frac{1}{2}$ -1 in. long, on peduncles of equal length, the blade of the leaf continued above the sheath, the sheath itself much wider than the blade. Spadix 6-12-flowered, its margins with transverse membranous appendages folded inwards, one over each carpel. Stigmas usually protruding through the slit of the spathe. Fruit about $\frac{1}{10}$ in. long, oblong, obscurely striate.—*Benth. Fl. Austral.* vii. 176; *Kirk in Trans. N.Z. Inst.* x. (1878) 392. *Z. Muelleri*, *Irmisch ex Aschers. in Linnæa*, xxxv. (1867-68) 168.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Muddy and sandy shores throughout, usually between high- and low-water marks. Widely distributed in temperate seas.

2. ***L. tasmanica***, Martens ex Aschers. in *Linnæa*, xxxv. (1867-68) 168 (?).—Rhizomes slender, wide-creeping. Leaves 9-18 in. long, $\frac{1}{10}$ - $\frac{1}{6}$ in. broad, narrow-linear, rounded at the tip, not truncate, with 1-3 stout nerves on each side of the midrib and several finer ones between, cross-veinlets distant. Flowers and fruit not seen.—*Z. marina*, Hook. f. *Handb. N.Z. Fl.* 742 (not of Linn.).

NORTH AND SOUTH ISLANDS: Not uncommon in sandy or muddy places along the coasts, often in water of considerable depth.

The exact position of the New Zealand plant must remain doubtful until the fructification has been obtained, but it is probably the same as the Australian and Tasmanian *Z. tasmanica*, which seems hardly different from narrow-leaved forms of the northern *Z. marina*.

ORDER LXXXIX. CENTROLEPIDÆ.

Annual or perennial tufted often moss-like plants, of small size. Leaves linear or setaceous, either all radical or densely imbricated on the short stems and branches. Flowers very small, usually hermaphrodite, one or several within 1-3 bracts, forming little heads or spikelets terminating short scapes or peduncles. Bracteoles or glumes under each flower 1-3, hyaline, sometimes wanting. Perianth none. Stamens 1-2; filaments filiform; anthers versatile, 1-celled. Ovary either 1-celled, or with 2-3 collateral cells, or of 2 or more free or irregularly connate carpels superposed in 2 rows; ovules solitary and pendulous in each cell or carpel; styles as many as the cells or carpels; stigmas linear. Fruit small, dry, pericarp membranous, the cells or carpels opening extrorsely by a longitudinal slit. Seed pendulous or laterally affixed; albumen farinaceous; embryo minute.

A small and inconspicuous order, comprising 4 or 5 genera and about 30 species. With the exception of the New Zealand species, one found in China, and one in antarctic South America, the order is confined to Australia. It has no properties of importance.

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|---|-----------------|
| Flowers crowded in a terminal head surrounded by several bracts. Stamens and 1-celled ovaries irregularly mixed, without inner bracts | 1. TRITHURIA. |
| Flowers within 2 alternate bracts, 1-5 within each bract. | |
| Stamen 1. Ovary of 3 or more carpels superposed in 2 rows (rarely reduced to 1) | 2. CENTROLEPIS. |
| Flowers with 2-3 alternate bracts, 1-2 within each bract. | |
| Stamens 2. Ovary of 2 collateral cells or carpels | 3. GAIMARDIA. |

1. TRITHURIA, Hook. f.

Minute tufted and stemless annual herbs. Leaves all radical, filiform. Scapes short, slender, terminating in several spreading bracts enclosing a head of minute flowers. Flowers numerous, densely crowded, each probably consisting of a single stamen and ovary, but the stamens and ovaries so closely placed as to appear irregularly mixed. Perianth wanting. Stamens with a filiform filament and oblong anther. Carpels 3-angled or compressed in the Australian species, not angled in the one found in New Zealand. Styles 2-3 or numerous. Fruiting carpels 2-3-angled in the Australian species, splitting from the base upwards into as many valves as angles.

The genus also includes 2 species found in Australia.

1. **T. (?) inconspicua**, *Cheesem. n. sp.*—A very minute slender perfectly glabrous annual herb, forming dense moss-like tufts $\frac{1}{2}$ –1 in. high. Leaves numerous, all radical, linear-filiform, strict, erect, terete, tapering gradually to an acute point. Scapes very short in the flowering stage, lengthening to one-half or three-quarters the length of the leaves when in fruit. Bracts 3–4, erect or erectopatent, linear-lanceolate, acute, thin and membranous, $\frac{1}{12}$ – $\frac{1}{8}$ in. long. Stamens not seen. Ovaries 6–12 or more, densely crowded, bright-red, stipitate, ovoid or oblong-ovoid, smooth, not angled nor compressed. Styles numerous, very delicate, forming a spreading brush at the tip of the ovary and much longer than it. Ripe fruit elliptic-ovoid, quite smooth, pale yellow-brown with a dark spot at each end.

NORTH ISLAND: Auckland—Sandy shores of Lake Ngatu, near Ahipara, *H. Carse* and *R. H. Matthews*!

A curious little plant, of which I only possess imperfect material. It differs in several respects from *Trithuria*, and may form the type of a new genus. All the flowers I have examined are without stamens, so that the stamens are either very fugitive, or the flowers are dioecious.

2. **CENTROLEPIS**, Labill.

Small tufted annual or perennial herbs. Leaves all radical or imbricating along the stems, linear or filiform. Scape slender, terminating in 2 floral bracts which are either subopposite or one a little above the other. Flowers hermaphrodite, sessile, from 1 to 5 within each bract; each flower with 1–3 hyaline scales, or rarely the scales altogether wanting. Stamen 1; filament very long, filiform; anther linear-oblong, 1-celled. Carpels from 3–8 (sometimes reduced to 1), connate and superposed in 2 rows; styles as many as the carpels, filiform, free or connate at the base. Fruiting carpels with a membranous pericarp, longitudinally dehiscent.

A small genus of about 20 species, all natives of Australia except 3 of those described herein, and one found in Cambodia.

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|--|-------------------------|
| Slender, annual, not pulvinate. Leaves scapes and bracts hispid. Flowers 3–8 within each bract | 1. <i>C. strigosa</i> . |
| Perennial, densely pulvinate. Stems very short, $\frac{1}{4}$ – $\frac{1}{2}$ in. Flowers 1 to each bract; carpels 3–5 to each flower | 2. <i>C. minima</i> . |
| Perennial, densely pulvinate. Stems soft, $\frac{1}{2}$ –1 in., glabrous. Flowers 1 to each bract; carpels 1–3 to each flower | 3. <i>C. pallida</i> . |
| Perennial, densely pulvinate. Stems soft, $\frac{1}{2}$ –2 in.; sheaths densely hairy. Flowers 1 or rarely 2 to each bract; carpels seldom more than 1 | 4. <i>C. viridis</i> . |

1. **C. strigosa**, *Roem and Schult. Syst. i. 43.*—A slender tufted annual herb 1–2 in. high. Leaves all radical, much shorter than the scapes, expanded into a broad membranous sheathing base below, above very narrow-linear or filiform, hispid throughout with

short spreading hairs. Scapes radical, slender, hispid like the leaves. Floral bracts 2, close together, ovate, awned at the tip, concave, spreading, hispid with long hairs. Flowers from 3 to 8 within each bract, each flower with 3 hyaline scales, the scales unequal in length, the largest one usually as long as the bract, the others shorter. Stamen 1, exserted. Carpels from 3 to 8 in each flower, superposed and connate in 2 rows; styles as many as the carpels, free almost to the base.—*Benth. Fl. Austral.* vii. 207; *Kirk in Trans. N.Z. Inst.* xxiii. (1891) 442.

SOUTH ISLAND.—Otago—Bluff Hill, *Kirk!* *H. J. Matthews!* December-January.

A common Australian and Tasmanian plant.

2. **C. minima**, *T. Kirk in Trans. N.Z. Inst.* xxiii. (1891) 441.—A minute glabrous densely tufted plant, forming flat moss-like patches. Stems very short, $\frac{1}{4}$ – $\frac{1}{2}$ in. high. Leaves equalling or rather shorter than the scape, distichous, linear-subulate, dilated into broad equitant membranous sheaths at the base. Scape short, stout. Floral bracts 2, opposite, ovate, erect, the outer one shortly awned. Flowers 1 to each bract, one of them with a stamen, the other usually without, filament very long. Hyaline scales wanting. Carpels from 2 to 5 to each flower, connate in 2 rows; styles as many as the carpels, connate at the base.

SOUTH ISLAND: Westland—Shores of Lake Brunner, *Kirk!* Otago—Lake Te Anau, *Petrie!* January–March.

Very closely allied to *C. pallida*, but a smaller stiffer plant, with more numerous carpels to the flowers.

3. **C. pallida**, *Cheesem.*—Forming compact pale-green cushion-shaped masses. Stems short, densely packed, $\frac{1}{2}$ – $1\frac{1}{2}$ in. high, leafy throughout. Leaves closely imbricate, distichous, $\frac{1}{8}$ – $\frac{1}{3}$ in. long; sheath half the length of the leaf or more, white and transparent, membranous, glabrous; lamina laterally compressed, ensiform-lanceolate or subulate, acute. Scape terminal, usually shorter than the leaves. Floral bracts 2, close together, unequal, the lower one the largest. Flowers 2, the upper one always with a stamen, the lower one frequently without, filament very long, the anther far exserted. Ovary of 1–3 (rarely 4) superimposed and connate carpels; styles as many as the carpels, connate at the base.—*Gaimardia pallida*, *Hook. f. Fl. Antarct.* i. 86. *Alepyrum pallidum*, *Hook. f. Fl. Nov. Zel.* i. 268, t. 62c; *Handb. N.Z. Fl.* 296.

NORTH ISLAND: Ruahine Mountains, *Colenso*. SOUTH ISLAND: Otago—Maungatua, Mount Kyebrun, Clinton Valley, Blue Mountains, *Petrie!* Campbell Island, *Sir J. D. Hooker, Kirk!* December–March.

Originally described as a *Gaimardia*, then transferred to *Alepyrum*, and replaced in *Gaimardia* by *Bentham* in the “Genera Plantarum.” But the structure of the flowers is not that of a true *Gaimardia*, and its nearest allies are undoubtedly *C. minima* and *C. viridis*.

4. *C. viridis*, *T. Kirk in Trans. N.Z. Inst.* xxiii. (1891) 441.—Forming soft green cushions in subalpine bogs sometimes several feet in diam. and 1–2 in. thick or more. Stems very densely compacted, erect, branched, leafy throughout. Leaves numerous, erect, imbricating, with broad scarious sheathing bases, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-subulate, channelled in front or terete, tip obtuse or acute, sheaths and sometimes the lower part of the lamina more or less clothed with soft white hairs. Scape terminal, usually exceeding the leaves. Floral bracts 2, alternate but close together, jointed at the base, the lower one with an obtuse often hooked point. Flowers 1 or more rarely 2 to each bract, each flower with a hyaline scale almost as long as the bract. Stamen 1, sometimes deficient in one of the flowers; filament very long. Carpel usually solitary but sometimes 2 connate in the lower flower; style 1 to each carpel, long, filiform.—*C. monogyna*, *Kirk in Journ. Linn. Soc.* xix. 286 (*not of Benth.*). *Gaimardia ciliata*, *Hook. f. Fl. Antarct.* i. 85; *Handb. N.Z. Fl.* 295.

NORTH ISLAND: Base of Ruapehu, *Petrie!* SOUTH ISLAND, STEWART ISLAND, AUCKLAND ISLANDS: Common in subalpine bogs throughout. Usually from 2000 to 5000 ft., but descends to sea-level in Stewart Island. December–March.

This appears to be a much larger plant than the Tasmanian *C. monogyna*, to which, however, it is certainly very closely allied. Neither it nor the two preceding species fit at all well into *Centrolepis*, from which they differ in the perennial densely pulvinate habit, the shape of the leaves, the flowers seldom more than one in each floral bract, and in the cells of the ovary (or carpels) being frequently reduced to one. Hieronymus, in his classification of the order given in Engler's *Pflanzenfamilien*, keeps up the genus *Alepyrum* for their reception, and probably that is the correct view to take.

3. *GAIMARDIA*, Gaud.

Small densely tufted perennial herbs; stems much branched, leafy throughout. Leaves numerous, densely imbricated, linear or setaceous. Scape terminal. Floral bracts 2 or 3, when 3 the upper one usually empty. Flowers 1 to each bract, sessile or stipitate. Stamens 2; filaments filiform; anthers linear-oblong. Ovary 2- or rarely 3-celled; the cells (or carpels) collateral, connate; styles the same number as the carpels, long, filiform. Fruiting carpels 2, or 1 by abortion.

A small genus of 2 or 3 species, found in antarctic South America, New Zealand, and Tasmania.

1. *G. setacea*, *Hook. f. Fl. Nov. Zel.* i. 267.—Perennial, densely tufted and compacted, forming broad moss-like patches sometimes 1–3 ft. across. Stems very numerous, branched, erect, leafy throughout, 1–3 in. high. Leaves numerous, erect, densely imbricate, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, linear-setaceous with acicular tips; sheaths broad, membranous, quite glabrous, entire, produced at the tip

into a free ligule. Scape terminal, rigid, erect, longer than the leaves. Floral bracts 2 or 3, alternate, convolute, appressed, obtuse, each 1-flowered or the uppermost empty. Hyaline scales absent. Stamens 2. Ovary of 2 connate collateral carpels; style 1 to each carpel, filiform. Fruiting carpels 2, or 1 by abortion.—*Handb. N.Z. Fl.* 297.

SOUTH ISLAND, STEWART ISLAND: Not uncommon in subalpine bogs throughout. 2500–4500 ft. December–March.

ORDER XC. RESTIACEÆ.

Sedge-like or rush-like perennial herbs, either tufted or with a creeping rhizome usually covered with imbricated scales. Stems rigid, simple or branched, erect or flexuose. Leaves either few, radical, linear and sedge-like, or more often nearly or altogether reduced to convolute scales sheathing the stem; sheaths usually split to the base. Flowers diœcious, very rarely hermaphrodite, in spikes or racemes or panicles, each flower furnished at the base with a dry and rigid bract (glume) and sometimes 2 bracteoles. Perianth regular, of 6, rarely more or less, rigid or scarious erect segments. Male flowers: Stamens 3; filaments free or rarely connate into a column; anthers oblong, usually 1-celled. Rudimentary ovary occasionally present. Female flowers: Staminodia present or absent. Ovary 1–3-celled; styles as many as the cells, free or connate at the base, stigmatic on the inner side; ovules solitary in each cell, pendulous, orthotropous. Fruit either a 1–3-celled capsule with longitudinal dehiscence or an indehiscent nut. Seeds 1 in each cell, pendulous, albumen farinaceous; embryo small, remote from the hilum.

A small order of about 20 genera and 230 species, almost confined to South Africa and Australia, the only species found outside these countries being the three occurring in New Zealand, one in Chili, and one in Cochin-China. The species have no important uses or properties.

Spikelets many-flowered, paniced.	Ovary 3-celled.	Fruit	
3-angled, dehiscing at the angles	.. ..	.. ..	1. LEPYRODIA.
Spikelets many-flowered, paniced.	Ovary 1-celled.	Nut	
3-angled, indehiscent	.. ..	.. ..	2. LEPTOCARPUS.
Spikelets few-flowered, female 1-flowered.	Ovary 1-celled.		
Nut ovoid, terete, smooth	.. ..	.. ..	3. HYPOLÆNA.

1. LEPYRODIA, R. Br.

Rhizome stout, creeping, scaly. Stems erect, simple or branched, terete. Leaves reduced to persistent or rarely deciduous sheathing scales. Flowers diœcious or monœcious, rarely hermaphrodite, in rather broad or narrow panicles, sometimes almost spicate, the inflorescence not conspicuously different in the two sexes. Glumes lanceolate, scarcely imbricate; bracteoles 2 at the base of each flower. Male flowers: Perianth-segments 6, glume-like or thin

and almost hyaline. Stamens 3; filaments distinct; anthers 1-celled. Female flowers: Perianth as in the males. Staminodia 3, sometimes with abortive anthers. Ovary 3-angled, 3-celled; styles 3, free or connate at the base; ovules 1 in each cell. Capsule triquetrous, dehiscent at the angles.

A small genus of 15 species, all confined to Australia except the following one.

1. **L. Traversii**, *F. Muell. Fragm.* viii. 79.—Rhizome stout, creeping, clothed with pale-chestnut scales; roots long, stringy. Stems stout, terete, polished, simple below, fastigiately branched above, 2–5 ft. high. Sheaths distant, closely appressed, acuminate, $\frac{3}{4}$ –1 in. long. Inflorescence a rather narrow closely branched red-brown terminal panicle 2–5 in. long; branches erect, unequal; bracts under the branches rigid, lanceolate, acuminate. Flowers sessile or shortly pedicelled within lanceolate glumes rather longer than the perianth; 2 scarious bracteoles at the base of each flower. Perianth-segments in both sexes red-brown, lanceolate, acute; male flowers with a small rudimentary ovary, females with 3 slender staminodia. Anthers linear-oblong, minutely apiculate. Ripe fruit 1-celled, 1-seeded, obliquely ovoid, triquetrous with the angles thickened, tipped with the remains of the style, at length dehiscent along the angles.—*Calorophus* sp., *Hook. f. Fl. Nov. Zel.* i. 267. *Sporadanthus Traversii*, *F. Muell. in Trans. N.Z. Inst.* vii. (1875) 389; *Kirk, ibid.* x. App. 41.

NORTH ISLAND: Auckland—Swamps between Hamilton and Ohaupo, Middle Waikato district, *T. F. C.* CHATHAM ISLANDS: Abundant in peaty swamps, *Dieffenbach, H. H. Travers! Cockayne!*

A very curious species. It differs from *Lepyrodia* in the 1-celled and 1-seeded fruit, and was consequently erected into a separate genus (*Sporadanthus*) by F. Mueller. In its other characters and in habit, however, it is altogether a *Lepyrodia*, and it appears best to consider it a species of that genus with the ovary 1-celled by abortion. I have not seen female flowers except old ones persistent with the fruit, and cannot say whether the ovary is 3-celled at an early stage, as seems probable.

2. **LEPTOCARPUS**, R. Br.

Stems simple or branched, terete, erect from a stout creeping scaly rhizome. Leaves reduced to persistent sheathing scales. Flowers diœcious, the spikelets with imbricate glumes with or without bracteoles, the male and female inflorescences alike or dissimilar, sometimes both sexes have the spikelets arranged in panicles, sometimes the male spikelets are pedicelled and paniculate, and the females sessile and fascicled or spicate. Male flowers: Perianth-segments 6. Stamens 3; filaments filiform; anthers 1-celled. Female flowers: Perianth as in the males. Staminodia 3 or none. Ovary 1-celled, triquetrous; styles 3, filiform; ovule solitary, pendulous. Fruit narrow-ovoid, triquetrous, indehiscent or splitting down the angles.

Species about 21, one in New Zealand, one in Cbili, another in Cochinchina, 7 in South Africa, the remainder confined to Australia.

1. **L. simplex**, *A. Rich. Fl. Nouv. Zel.* 142 (not of R. Br.).—Rhizome stout, creeping, clothed with chestnut-brown scales. Stems numerous, densely crowded, simple, slender, terete, rush-like, 1–5 ft. high. Sheaths closely appressed, blackish-brown, distant, $1\frac{1}{2}$ –4 in. apart. Male inflorescence paniced; panicles variable in size, sometimes long and slender, at other times short and contracted, alternate on the upper part of the stem. Spikelets numerous, sessile or pedicelled, red-brown, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, many-flowered. Glumes imbricate, ovate-lanceolate, acuminate, much longer than the flowers. Perianth-segments 4–6, lanceolate, the 3 inner rather smaller. Female inflorescence compacted into rounded or oblong often lobed or interrupted fascicles or glomerules, alternate along the stem. Glumes broadly ovate, acuminate. Perianth rather longer than in the males; segments 6, the 3 outer keeled, acuminate; the 3 inner flat, oblong, obtuse or mucronate. Fruit narrow-ovoid, triquetrous.—*A. Cunn. Precur.* n. 291; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 265, t. 61; *Handb. N.Z. Fl.* 294. *Restio simplex*, *Murr. Syst. Veg.* v. 882; *Forst. Prodr.* n. 367.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Salt marshes and sandy shores, abundant. Also inland near hot springs at Rotorua and at Tokaanu (Lake Taupo). *Oioi.* September–December.

3. **HYPOLÆNA**, R. Br.

Stems slender, much branched, often flexuous. Leaves reduced to persistent sheathing scales. Flowers diœcious, in spikelets with imbricate glumes and no bracteoles; the male spikelets few- or many-flowered, rarely 1-flowered, solitary or 2 together along the branchlets, or several in a terminal panicle; the females 1-flowered, either solitary or 2–3 together near the tips of the branches. Male flowers: Perianth-segments 6, narrow, thin. Stamens 3; filaments filiform; anthers 1-celled. Female flowers: Perianth-segments 6, smaller than in the males, very thin, almost hyaline. Staminodia when present 3. Ovary 1-celled; style-branches 2 or 3, filiform; ovule solitary, pendulous. Fruit an ovoid or obovoid terete indehiscent 1-seeded nut.

A genus consisting of about 12 species natives of South Africa, and 5 found in Australia, one of the latter extending to New Zealand.

1. **H. lateriflora**, *Benth. Fl. Austral.* vii. 238.—Stems slender, much branched, flexuose and often interlacing, usually from 9–18 in., but sometimes forming dense masses 2–3 ft. high. Sheaths $\frac{1}{2}$ – $\frac{3}{4}$ in. long, closely appressed, often ciliate at the mouth, with a short subulate spreading tip. Male spikelets 1 or 2 together in the upper sheaths, each spikelet 3–6-flowered; glumes rather

thin, rigid, tip acute. Perianth-segments 6, very narrow-linear, acute. Stamens 3; anthers linear-oblong. Female spikelets solitary within the uppermost sheaths, 1-3-flowered. Perianth-segments 6 or 4, very small, the inner not much longer than the ovary, broadly ovate, thin and hyaline. Style-branches 3. Nut broadly ovoid, terete, with a thick and swollen base.—*Calorophus elongatus*, *Lab. Pl. Nov. Holl.* ii. 78, t. 228 (*in part*); *Hook. f. Fl. Nov. Zel.* i. 267; *Handb. N.Z. Fl.* 297.

Var. **minor**, *Hook. f. Handb. N.Z. Fl.* 297.—Much smaller and more slender, sometimes only a few inches high. Male spikelet solitary, 2-3-flowered; female usually 1-flowered.—*Calorophus minor*, *Hook. f. Fl. Nov. Zel.* i. 267.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: The typical form not uncommon in lowland swamps in the North Island, from the North Cape southwards; var. *minor* abundant in mountain districts throughout. Sea-level to 4500 ft. November–March.

Also an abundant Australian and Tasmanian plant. The var. *minor* passes insensibly into the ordinary form.

ORDER XCI. CYPERACEÆ.

Grassy or rush-like herbs, usually perennial. Stems solid or rarely slightly hollow, often trigonous, sometimes compressed or terete. Leaves alternate, mostly radical, few or many, sometimes wanting or reduced to sheathing scales; sheaths closed, not split to the base. Flowers hermaphrodite or unisexual, minute, solitary and sessile in the axils of small imbricated bracts (glumes), which are aggregated into few- or many-flowered (rarely 1-flowered) spikelets. Spikelets either solitary and terminal, or arranged in spikes, racemes, panicles, or clusters. Glumes rigid or scarious or membranous, concave, distichous or imbricated all round, persistent or deciduous, 1 or 2 (rarely more) at the base of each spikelet empty. Perianth wanting or represented by few hypogynous bristles or scales. Stamens 1-3, rarely 4-6, hypogynous; filaments linear, flat, often elongating after flowering; anthers usually exerted from the spikelet and pendulous, linear, basifixed, 2-celled. Ovary entire, 1-celled, in *Carex* and its allies enclosed in a peculiar flask-shaped organ called the utricle or perigynium formed of 1 or 2 modified bracteoles; style short or long, 2-3-cleft, divisions stigmatic on the inner side; ovule solitary, basal, erect, anatropous. Fruit a small indehiscent nut (in *Carex* enclosed in the utricle), lenticular or compressed or more often trigonous. Seed erect; testa membranous; albumen farinaceous; embryo minute, at the very base of the albumen.

A very large order, found in all parts of the world, both temperate and tropical, and in almost all stations, but most abundant in marshes, or by the margins of lakes and rivers. It is closely allied to grasses, being chiefly dis-

tinguished by the stiffer habit, solid and usually angled or compressed stems, entire leaf-sheaths, basifixed anthers, undivided (not plumose) stigmas, and by the position of the embryo. Genera 65; species estimated at 3400. Notwithstanding the extent of the order, it is of little economic importance. The herbage is too coarse and harsh, and too deficient in nutritive properties, to be serviceable as food for cattle; and the seed is useless. The tuberous roots of certain species of *Scirpus* and *Cyperus* contain starch, and have been used as food, while in others they are bitter, tonic, and stimulating, and have been employed in medicine. Many species are serviceable for paper-making, or in the fabrication of mats, baskets, &c. The paper of the ancients was manufactured from the well-known *Papyrus*, a plant common along the Nile and in other parts of tropical Africa. Of the 14 genera found in New Zealand 9 are either cosmopolitan or very widely distributed; 2 (*Carpha* and *Oreobolus*) are confined to Australia and South America; *Uncinia* has a similar range, but extends northwards to the Sandwich Islands, Mexico, and the West Indies; the 2 remaining (*Lepidosperma* and *Gahnia*) are mainly Australian, but reach as far north as Malaya and China.

I have to express my indebtedness to Mr. C. B. Clarke, F.R.S., whose knowledge of the order is unrivalled, for his unwearied kindness in supplying me with information and critical notes respecting the New Zealand species. He has also, at considerable trouble to himself, furnished me with a list of the synonymy of the species, taken from the MSS. of the general work on the *Cyperaceæ* of the world, on which he has been engaged for some years past. His assistance has been of the greatest possible use.

Tribe CYPEREÆ.—Spikelets usually many-flowered, flat or compressed. Glumes distichous, imbricate, lower 1-2 empty. Flowers hermaphrodite or the upper 1-2 male by arrest. Hypogynous bristles absent.

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| Spikelets small, 1- or rarely 2-flowered, clustered in a simple or lobed head. Style 2-fid | 1. KYLLINGA. |
| Spikelets many-flowered; glumes falling away from the persistent rhachilla. Style 3-fid | 2. CYPERUS. |
| Spikelets many-flowered; glumes persistent, the rhachilla finally coming away above the 2 lowest. Style 3-fid .. | 3. MARISCUS. |

Tribe SCIRPEÆ.—Spikelets usually many-flowered, terete. Glumes spirally arranged, lower 1-2 empty. Flowers hermaphrodite or the upper 1-2 male. Hypogynous bristles often present.

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| Leafless. Spikelet solitary, terminal. Nut crowned by the persistent thickened base of the style. Hypogynous bristles present | 4. ELEOCHARIS. |
| Leaves radical. Spikelets umbellate. Style bulbous at the base, usually deciduous. Hypogynous bristles wanting | 5. FIMBRISTYLIS. |
| Spikelets few or many, fascicled or umbelled. Style not thickened at the base, continuous with the nut. Hypogynous bristles present or wanting | 6. SCIRPUS. |

Tribe RHYNCHOSPOREÆ.—Spikelets 1- or few-flowered, terete or compressed. Glumes spirally arranged, several (usually more than 2) of the lower ones empty. Hermaphrodite flowers 1 or 2; the remainder male or imperfect.

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|--|-------------|
| Alpine, leafy at the base. Spikelets in a terminal corymb, compressed, pale, 1-flowered; glumes 4, distichous. Hypogynous bristles long, plumose | 7. CARPHA. |
| Spikelets few-flowered, compressed; glumes several, distichous. Rhachilla often elongated and flexuose between the flowers | 8. SCHÆNUS. |

- Spikelets 1-7-flowered, lowest flower alone hermaphrodite; glumes not distichous. Stamens 3, rarely elongating. Hypogynous bristles wanting 9. CLADIUM.
- Spikelets 1-3-flowered, upper flower alone hermaphrodite. Stamens 3, rarely elongating. Hypogynous bristles present 10. LEPIDOSPERMA.
- Tall, harsh and grassy. Spikelets 1-3-flowered, upper flower alone hermaphrodite. Stamens 3-6, usually elongating in fruit and holding the nut. Hypogynous bristles wanting 11. GAHNIA.
- Dwarf alpine plants forming dense cushions in bogs. Spikelets solitary or 2-3 together, 1-flowered; glumes 3. Hypogynous scales (perianth) 6, persistent .. 12. OREOBOLUS.

Tribe CARICEÆ.—Spikelets monœcious, the male and female flowers in the same or in distinct spikelets; rarely diœcious. Nuts enclosed in an entire or 2-fid inflated sac (utricle).

- Spikelet solitary, androgynous. Rhachilla produced beyond the utricle into a hooked bristle 13. UNCINIA.
- Spikelet solitary, or more often clustered or spicate or panicled, androgynous or unisexual. Rhachilla not produced beyond the utricle.. .. 14. CAREX.

1. KYLLINGA, Rottb.

Stems slender, simple, erect, leafy at the base. Spikelets small, numerous, compressed, 1-3-flowered, densely crowded in 1-3 ovoid or cylindric terminal heads or spikes subtended by 2-6 unequal linear leaf-like bracts. Glumes 4-7, distichous; the two lowest small, empty; the next, or rarely the two next, hermaphrodite and fruit-bearing; the upper ones male or the uppermost smaller and empty; in fruit the rhachilla falls away above the two lowest glumes. Hypogynous scales wanting. Stamens 1-3. Style continuous with the ovary, not thickened at the base; branches 2, filiform. Nut laterally compressed, smooth.

A genus of about 40 species, widely spread through the warmer regions of both hemispheres, but not found in Europe.

1. *K. brevifolia*, Rottb. *Desc. et Ic.* t. 4, f. 3.—Rhizome creeping, elongate. Stems numerous from the rhizome, slender, 4-12 in. high or more. Leaves flat, grassy, usually shorter than the stems, $\frac{1}{10}$ - $\frac{1}{6}$ in. broad. Bracts usually 3, spreading, similar to the leaves. Spikes solitary or rarely 2-3 together, broadly ovoid, greenish, $\frac{1}{5}$ - $\frac{1}{3}$ in. long. Spikelets about $\frac{1}{8}$ in.; fertile flower usually solitary. Glume of fertile flower ovate, mucronate, eglandular, keeled; keel not winged above, 3-nerved; sides of glume with 3-4 striæ. Stamens 2. Nut ellipsoid, pale yellow-brown, about half as long as the glume.—*C. B. Clarke in Hook. f. Fl. Brit. Ind.* vi. 588. *K. monocephala*, *Cheesem. in Trans. N.Z. Inst.* xi. (1879) 434 (*not of Rottb.*).

NORTH ISLAND: Auckland—From Mongonui and Ahipara northwards to the North Cape, *W. T. Ball! T. F. C.* December-February.

Common in most warm countries, and possibly only naturalised in New Zealand. It is very closely allied to the equally abundant *K. monocephala*, to which I formerly referred it, but which can be distinguished by the glume of the fertile flower having the upper part of the keel winged or crested and more or less glandular.

2. CYPERUS, Linn.

Annual or more commonly perennial herbs. Stems erect, simple below the inflorescence. Leaves at the base of the stem, usually long, the lowest sometimes reduced to sheaths. Inflorescence umbellate or capitate, often large and compound; bracts at the base long, leaf-like, spreading. Spikelets oblong or linear, compressed; rachilla persistent. Glumes usually many, distichous; the two lowest empty; four at least and generally many of the succeeding ones hermaphrodite and fruit-bearing, falling away from the rachilla one by one, commencing with the lowest; the uppermost 1-3 sterile or empty. Stamens 2-3, rarely 1. Style continuous with the ovary, not thickened at the base; branches 3, filiform. Nut triquetrous or plano-convex, the flat face against the rachilla, surface smooth.

A large genus of over 300 species, most abundant in the tropical and sub-tropical districts of both hemispheres, comparatively rare in temperate regions. The two New Zealand species are widely distributed; one of them is certainly a recent introduction, and possibly the other as well.

Small, 1-3 in. high. Inflorescence of a single head;	
spikelets 1-3 	1. <i>C. tenellus</i> .
Tall, 1-2 ft. high. Inflorescence in a compound umbel;	
spikelets very numerous 	2. <i>C. vegetus</i> .

The tropical *C. rotundus*, Linn., easily recognised by the black ovoid tubers on the creeping stolons, and hence frequently known by the name of "nut-grass," has become naturalised in the vicinity of Auckland. It is a most pernicious weed.

1. *C. tenellus*, Linn. *f. Suppl.* 103.—A small densely tufted annual. Stems numerous, very slender, almost filiform, 1-3 in. high. Leaves few, much shorter than the stem, filiform. Spikelets 1-3 together, digitate, much flattened, oblong, obtuse, large for the size of the plant, $\frac{1}{8}$ – $\frac{1}{4}$ in. long; bracts 2, setaceous, one erect and continuous with the stem, the other much smaller. Glumes 10-25, regularly distichous, ovate, obtuse or mucronate, boat-shaped, conspicuously 5-9-nerved, varying in colour from almost white to red-brown. Stamens 1 or 2. Style-branches 3, linear. Nut rather more than half the length of the glume, elliptical, acutely trigonous, smooth.—*Hook. f. Handb. N.Z. Fl.* 745; *Benth. Fl. Austral.* vii. 265; *C. B. Clarke in Fl. Cap.* vii. 164.

NORTH ISLAND: From the North Cape southwards to Taranaki and Hawke's Bay, abundant. Sea-level to 1500 ft. November-December.

A common South African plant, doubtfully indigenous in temperate Australia and New Zealand.

2. **C. vegetus**, Willd. *Sp. Plant.* i. 283. — Roots fibrous. Stems 1–2 ft. high, rather stout, smooth, sharply 3-angled above. Leaves shorter than the stem, rather flaccid, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad; margins smooth. Inflorescence a terminal compound umbel varying from $1\frac{1}{2}$ to 6 in. diam.; rays 5–9, unequal, each terminated by a dense globose umbellule; bracts about 6, similar to the leaves, long and spreading, the lowest in large specimens sometimes 18 in. long. Spikelets very numerous, pale yellowish-green, much compressed, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, 12–40-flowered. Glumes distichous, boat-shaped, ovate, apiculate, 3-nerved, margins membranous. Stamen 1. Nut about $\frac{2}{3}$ the length of the glume, obovoid-triquetrous, shortly rostrate. Style-branches 3, linear. — *C. gracilis*, Buch. in *Trans. N.Z. Inst.* iii. (1871) 210 (not of R. Br.). *C. Buchanani*, Kirk in *Trans. N.Z. Inst.* x. (1878) App. xli.

NORTH ISLAND: Auckland—Oruru and Oruaiti Valleys, near Mongonui. T. F. C. Wellington—Lower Hutt, Waiwetu, Wainuiomata, Greytown, *Buchanan!* Kirk! November–January.

The true home of this plant, as has been pointed out by Mr. C. B. Clarke (*Journ. Bot.* 1897, 71) is in temperate South America, and there can be no doubt that it exists only as an introduced species in New Zealand, as also in many localities in southern Europe, the Azores, North America, Tahiti, &c. I retain it in the Flora because it has been twice described as an indigenous species, and on account of the remarkable fact that wherever found it presents all the appearance of a true native, and would certainly be taken as such by any one unacquainted with its origin.

3. **MARISCUS**, Gaertn.

Stems erect, simple below the inflorescence, leafy at the base. Inflorescence of the same forms as in *Cyperus*. Spikelets oblong or linear, compressed; rachilla disarticulating above the two lowest empty glumes, and falling away in one piece, leaving a terminal rounded boss or knob. All other characters as in *Cyperus*.

Species about 180, found in all tropical and subtropical regions, but not extending into Europe. The single New Zealand species is endemic.

1. **M. ustulatus**, C. B. Clarke, *MS.*—Very robust, 2–4 ft. high. Stems smooth, striate, trigonous, $\frac{1}{4}$ in. diam. Leaves crowded at the base of the stem, long, keeled, coriaceous, spongy towards the base, $\frac{1}{3}$ –1 in. broad; margins and keel sharply and minutely serrulate. Inflorescence a large terminal umbel often more than 6 in. diam.; rays 6–10, each bearing an oblong spike 1–2 in. long of very numerous red-brown spikelets; bracts numerous, forming an involucre at the base of the umbel, very long and leafy, the lowest frequently over 2 ft. Spikelets linear-lanceolate, $\frac{1}{3}$ –1 in. long, 5–20-flowered. Glumes distichous, ovate-oblong, obtuse or mucronate, smooth and shining, grooved. Stamens 3. Nut linear-oblong, trigonous; style-branches 3.—*Cyperus ustulatus*, A. Rich. *Fl. Nouv. Zel.* 101, t. 17; A. Cunn. *Precur.* n. 270; Raoul, *Choix*, 40; Hook. f. *Fl. Nov. Zel.* i. 268; *Handb. N.Z. Fl.* 297.

NORTH ISLAND: Abundant in lowland districts throughout. SOUTH ISLAND: Chiefly near the coast, extending as far south as Okarito (Hamilton) and northern Otago (Buchanan). Sea-level to 1500 ft. Toetoe-upoko-tangata; Toetoe-whatu-manu. November—January.

4. ELEOCHARIS, R. Br.

Stems simple, erect, without perfect leaves. Sheaths few, the uppermost cylindric, truncate or produced on one side into a short tooth. Inflorescence a single terminal many-flowered terete spikelet. Glumes many, imbricate all round the rhachis; the lowest 1 or 2 empty, shorter than the spikelet; many succeeding ones hermaphrodite and fruit-bearing; the uppermost male or sterile. Hypogynous bristles usually 6, but varying from 3 to 8, rarely absent. Stamens 3 or fewer. Style swollen at the base; branches 3 or 2, linear. Nut obovoid, trigonous or plano-convex.

Species estimated at 115, distributed over the whole world, but most numerous in America. Of the 5 found in New Zealand, 2 are endemic, 2 extend to Australia, the remaining one is almost cosmopolitan.

A. *Limnochloa*. Stem stout, spikelet large, hardly wider than the stem. Glumes subrigid.

Stems stout, septate. Spikelet 1–2 in. long 1. *E. sphacelata*.

B. *Eleogenus*. Stem slender. Spikelets small, broader than the stem. Glumes membranous. Style 2-fid.

Stems short, 1–2½ in. Spikelet ½–¾ in. 2. *E. neo-zealandica*.

C. *Eu-Eleocharis*. Stem slender. Spikelet small, broader than the stem. Glumes membranous. Style 3-fid.

Stems 2–6 in., filiform. Spikelets ½–¾ in., compressed.

Nut longitudinally ribbed and transversely striate .. 3. *E. acicularis*.

Stems 4–18 in., rather stout. Leaf-sheath truncate with an erect mucro. Spikelet ¼–¾ in. Nut smooth .. 4. *E. acuta*.

Stems 3–15 in., very slender. Leaf-sheath oblique, acute.

Spikelet ½–¾ in. Nut smooth 5. *E. Cunninghamii*

1. *E. sphacelata*, R. Br. Prodr. 224.—Rhizome stout, creeping, stoloniferous. Stems stout, cylindrical, 1–3 ft. high, ⅓ in. diam., hollow, transversely septate; sheaths long, membranous. Spikelet very large, 1–2 in. long, ⅓ in. diam., solitary, terminal, cylindrical, pale-coloured, tip acute. Glumes numerous, very closely imbricate, obovate-oblong, obtuse, 1-nerved, membranous, pale with a brown line just inside the scarious margin. Hypogynous bristles 6–9, usually exceeding the nut, retrorsely scabrid. Style very long, branches 3. Nut broadly obovoid, compressed, minutely granular, pale, crowned with the persistent dark-brown conic swollen base of the style.—A. Cunn. Precur. n. 277; Raoul, Choix, 40; Hook. f. Fl. Nov. Zel. i. 269; Handb. N.Z. Fl. 300; Benth. Fl. Austral. vii. 292 (Heleocharis).

NORTH ISLAND: Wet swamps and margins of lakes, not uncommon. SOUTH ISLAND: Nelson—Takaka, *Kirk*! Canterbury, *Armstrong*. Westland—Okarito, *A. Hamilton*! Southland—Bluff Island, *Lyall*. STEWART ISLAND: Head of Paterson's Inlet, *Petrie*! Sea-level to 1500 ft. December–February.

An abundant Australian and Tasmanian plant, and very closely allied to the widely diffused *E. plantaginea*, R. Br.

2. *E. neo-zealandica*, *C. B. Clarke ex T. Kirk in Trans. N.Z. Inst.* xxvi. (1894) 260.—Rhizome slender, creeping, 1–3 in. long. Stems short, 1–2½ in. high, striate; sheath membranous, mouth oblique. Spikelet solitary, terminal, 1–¼ in. long, broadly ovoid, much wider than the stem, 4–8-flowered. Glumes broadly ovate, concave, obtuse, red-brown with a paler centre and scarious margins. Hypogynous bristles wanting. Stamens 3. Style with 2 linear arms and a very small swollen base. Nut obovoid, biconvex, smooth, pale-brown.

NORTH ISLAND: Auckland—Sand-dunes between Cape Maria van Diemen and Ahipara, *T. F. C.* SOUTH ISLAND: Nelson—Cape Farewell, *Kirk*!

A curious little species, belonging to the section *Eleogenus*, characterized by the spikelets broader than the slender stems, membranous glumes, and 2-fid style. Mr. Clarke remarks that it approaches the section *Isolepis* of *Scirpus* in the absence of hypogynous bristles and the reduced size of the swollen base of the style.

3. *E. acicularis*, *R. Br. Prodr.* 224.—Rhizome very slender, almost filiform, creeping, stoloniferous. Stems numerous, tufted, extremely slender, capillary, 2–6 in. high; sheaths membranous, acute. Spikelet small, slender, 1–½ in. long, compressed, pale to dark-brown, 3–6-flowered. Glumes ovate, obtuse, membranous, brown with a greenish or pale centre and narrow scarious margins. Hypogynous bristles 2–4, short, deciduous. Style-branches 3; style-base small, conic, depressed. Nut small, pale, obovoid-oblong, longitudinally ribbed and with minute transverse striæ between the ribs.—*Kunth, Enum.* ii. 141; *C. B. Clarke in Hook. f. Fl. Brit. Ind.* vi. 628.

SOUTH ISLAND: Otago—Lake Te Anau, *Petrie*! (No. 1647).

I have seen no specimens but Mr. Petrie's, which are in young flower only. Mr. C. B. Clarke, who has examined them, states that he is satisfied that they belong to the small group consisting of *E. acicularis* and a few very closely allied species, and most probably to *E. acicularis* itself, which is an almost cosmopolitan plant, although not yet recorded from Australia.

4. *E. acuta*, *R. Br. Prodr.* 224.—Rhizome creeping. Stems numerous, tufted, 4–18 in. high, rather stout or slender, striate; sheath closely appressed to the stem, with a horizontally truncate mouth, the margin of which is thickened and usually dark-coloured, with a small erect mucro or rudimentary lamina on one side.

Spikelet variable in length, $\frac{1}{4}$ – $\frac{3}{4}$ in. or more, linear-oblong, cylindric, obtuse or subacute, many-flowered. Glumes broadly ovate, obtuse, membranous, concave, brown with usually a pale line down the centre; margins broad, scarious. Hypogynous scales 4–8, exceeding the nut. Stamens 3. Style-branches 3. Nut broadly obovoid, biconvex, smooth or very minutely pitted, brown, crowned by the small conic style-base.—*Hook. f. Handb. N.Z. Fl.* 745; *Benth. Fl. Austral.* vii. 294 (*Heleocharis*). *E. gracilis* (*excl. var. b and y*), *Hook. f. Fl. Nov. Zel.* i. 270; *Handb. N.Z. Fl.* 301 (*not of R. Br.*). *E. ambigua*, *Kirk ex Buch. in Trans. N.Z. Inst.* vi. (1874) 225.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in wet places from the North Cape to Foveaux Strait. Sea-level to 2000 ft. November–March.

Also plentiful in Australia, Tasmania, and Norfolk Island.

5. ***E. Cunninghamii***, *Boeck. in Flora*, xli. (1858) 412 (*Heleocharis*).—Rhizome long, creeping, scaly, stout or slender, dark red-brown or almost black. Stems many from the rhizome, variable in length, 3–15 in., very slender, sometimes almost filiform, striate; sheath membranous, with a thin oblique mouth. Spikelet small, short, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, broadly ovoid, subacute, 5–20-flowered. Glumes broadly oblong, obtuse, membranous, usually pale but often stained with red-brown; margins broad, scarious. Hypogynous bristles 4–8, exceeding the nut. Style-branches 3. Nut broadly obovoid, plano-convex or obscurely trigonous, smooth, pale yellowish-brown, crowned by the small pyramidal style-base, which is rather broader than the top of the nut.—*Linnaea*, xxxvi. (1869–70) 427. *E. gracilis*, *var. gracillima* and *var. radicans*, *Hook. f. Fl. Nov. Zel.* i. 270; *Handb. N.Z. Fl.* 301 (*not of R. Br.*). *E. gracillima*, *Hook. f. Handb. N.Z. Fl.* 745. *Heleocharis Hookeri*, *Boeck. in Linnaea*, xxxvi. (1869–70) 430. *Isolepis acicularis*, *A. Rich. Fl. Nouv. Zel.* 103 (*not of R. Br.*).

NORTH AND SOUTH ISLANDS.—Wet places from the North Cape to Foveaux Strait, but often local in the South Island. Sea-level to 2000 ft. November–March.

Hooker's two varieties *gracillima* and *radicans*, originally published as forms of the Australian *E. gracilis*, only differ in size and degree of development, *radicans* being clearly a depauperated state. In many localities they can be seen to merge into one another. Boeckeler, probably working upon scanty herbarium material, treated them as distinct species, publishing his *E. Cunninghamii*, which answers to *var. radicans*, in 1858, and *E. Hookeri*, which is equivalent to *var. gracillima*, in 1869. *E. Cunninghamii* has several years' priority over Hooker's *gracillima*, which was not published until 1867, but it is unfortunate that it was not originally applied to what must be considered the type of the species, Hooker's *var. gracillima*.

5. **FIMBRISTYLIS**, Vahl.

Annual or perennial tufted herbs, usually of small or medium size. Leaves from near the base of the stem, grassy or filiform. Inflorescence a terminal simple or compound umbel, or reduced to a

solitary terminal spikelet. Spikelets many-flowered. Glumes imbricate all round or rarely distichous; the lowest 1-2 empty; the remainder all hermaphrodite, or the uppermost male or sterile. Hypogynous bristles wanting. Stamens 3, more rarely 2 or 1. Style often hairy or ciliate, with a bulbiform or conic base, deciduous; style-branches 3 or 2. Not obovoid, trigonous or biconvex, often narrowed at the base.

A large genus of about 130 species, found in all tropical or warm-temperate regions.

1. **F. squarrosa**, *Vahl. Enum.* ii. 289.—A slender more or less pubescent annual 2-8 in. high; stems numerous, tufted, striate. Leaves linear, setaceous, shorter than the stems. Umbel terminal, usually compound, 1-3 in. diam.; rays slender, unequal, 1-2 in. long; bracts 3-4, similar to the leaves, often exceeding the umbel. Spikelets numerous, on slender pedicels, $\frac{1}{8}$ — $\frac{1}{2}$ in. long, narrow-ovoid, brownish. Glumes elliptic-lanceolate, acuminate, keeled, 3-nerved, more or less squarrose. Stamens 1 or 2. Style pubescent, the bulbiform base with numerous long hairs which hang over the nut and are closely appressed to it; style-branches 2. Nut about $\frac{1}{3}$ the length of the glume, obovoid-oblong, biconvex, pale-yellow, smooth.

Var. **velata**, *C. B. Clarke*.—Nerves of the glumes almost fused into a solid keel, the excurrent tip not nearly so squarrose.—*F. velata*, *R. Br. Prodr.* 227; *Hook. f. Fl. Nov. Zel.* i. 272; *Benth. Fl. Austral.* vii. 309. *F. dichotoma*, *Hook. f. Handb. N.Z. Fl.* 303 (not of *Vahl.*).

NORTH ISLAND: Auckland—Bay of Islands, *Colenso!* near Auckland(?), *Sinclair*; Port Waikato, *Kirk!* hot springs at Ohinemutu, Lake Rotorua, *Kirk!* *T. F. C.*; Lake Rotomahana, *Filhol.* Sea-level to 1000 ft. December–February.

The typical form of the species is found in most warm countries; the var. *velata* is restricted to eastern Australia and New Zealand.

6. **SCIRPUS**, Linn.

Glabrous annual or perennial herbs of very various habit, small and tufted, or tall and stout with a creeping rhizome. Leaves usually from near the base of the stem, long or short, sometimes reduced to appressed sheaths. Spikelets usually many-flowered, solitary or fascicled, or more numerous and umbellate or paniced. Glumes imbricate all round the rhachis; lowest 1 or 2 empty; several or many succeeding ones hermaphrodite and fruit-bearing; the uppermost sterile. Hypogynous bristles 3-8 or wanting. Stamens 3 or fewer. Style long or short, passing gradually into the nut; style-branches 2 or 3. Nut obovoid or broadly oblong, trigonous or plano-convex, sessile or nearly so.

A somewhat heterogeneous assemblage of about 130 species, found in all parts of the world, both tropical and temperate. Of the 13 species found in New Zealand, 4 are generally distributed in both the Northern and Southern Hemispheres; 6 extend to Australia, 3 of them reaching South Africa as well; 1 is found in Tristan d'Acunha; the remaining 2 are endemic. The student will find it a difficult and perplexing task to discriminate between several of the species of the first section.

Section I. Isolepis. Usually small and slender plants. Spikelets in clusters or solitary. Hypogynous bristles wanting.

* Spikelets solitary or 2-3 in a head.

- Stems long, slender, often much branched and floating.
Spikelet solitary. Style-branches 2. Nut biconvex, white 1. *S. lenticularis*.
Stems very short, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, leafy. Spikelets usually solitary, concealed by the leaves. Style-branches 2. Nut biconvex, brown 2. *S. basilaris*.
Stems 1-6 in., branched below. Leaves several, equalling the stems. Spikelets 1-2. Style-branches 3. Nut obovoid, obtusely trigonous, white 3. *S. aucklandicus*.
Stems 2-6 in. Leaves 1-2, shorter than the stems. Spikelets 1-3. Style-branches 3. Nut obovoid, obtusely trigonous 4. *S. cernuus*.

** Spikelets usually more than 3 in a cluster (sometimes reduced to 1 in small states of *S. antarcticus* and *S. inundatus*).

- Stems $\frac{1}{2}$ –6 in. Leaves 1-3, often rigid and cartilaginous. Spikelets 1-9; glumes rigid, keeled, grooved on the sides. Stamens 3. Style-branches 3. Nut acutely trigonous, yellow to dark-brown 5. *S. antarcticus*.
Stems 2-12 in., usually slender and flaccid. Leaves 1-2 or wanting. Heads often proliferous; spikelets 2-15. Stamen 1. Style-branches 3. Nut acutely trigonous, white 6. *S. inundatus*.
Stems 8-16 in., rather stout, leafless. Spikelets 6-20, short, oblong. Stamen usually 1. Style-branches 2. Nut plano-convex, smooth and polished, pale 7. *S. sulcatus*.
Stems 1-2 ft., rather stout, flaccid, leafless. Spikelets 10-30, long, linear. Stamens 3. Style-branches 3. Nut acutely trigonous 8. *S. prolifer*.
Stems 1-3 ft., stout, rigid, erect, leafless. Spikelets numerous, short, ovoid, crowded. Stamens 3. Style-branches 3. Nut obtusely trigonous, brown 9. *S. nodosus*.

Section II. Desmoschcenus. Tall, harsh, rigid and coriaceous. Spikelets numerous, spirally arranged around the upper part of the stem. Hypogynous bristles wanting.

- Rhizome long. Stems 1-3 ft. Leaves numerous, subsquarrose 10. *S. frondosus*.

Section III. Eu-Scirpus. Usually large. Stem leafy at the base or leaves wanting. Spikelets usually paniced or umbelled, rarely in heads or solitary. Hypogynous bristles present.

- Stems acutely trigonous, 1-2 ft. high. Leaves 1-4, trigonous, shorter than the stem. Spikelets few, crowded into a small head 11. *S. americanus*.

- Stems terete, spongy, leafless, 2-6 ft. high. Spikelets in a broad panicle or umbel 2-4 in. diam. 12. *S. lacustris*.
 Stems acutely trigonous, 1-5 ft. high. Leaves longer than the stems, broad, flat. Spikelets in a terminal umbel; involucre bracts long, leafy. 13. *S. maritimus*.

1. *S. lenticularis*, *Poir. Encyc. Suppl.* v. 103.—Stems slender, in very wet places 6-18 in. long, elongated and much branched, putting out a small tuft of leaves at each node, often forming large floating masses; in drier situations shorter and stouter, much more sparingly branched, 2-6 in. high. Leaves 1-3 in. long, filiform in floating specimens, stouter in terrestrial ones. Peduncles shorter or longer than the leaves, slender, usually 1 from each tuft of leaves, each bearing a single terminal spikelet. Spikelets variable in size, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, oblong or oblong-ovoid, obtuse, pale-green; bract (lowest glume) usually longer than the spikelet. Glumes ovate, acute, concave but scarcely keeled, green, sometimes stained with chestnut-brown. Hypogynous bristles wanting. Stamens 2 or 3. Style-branches 2. Nut three-quarters the length of the glume, obovoid, biconvex, tipped by a minute point, slightly narrowed at the base, smooth, pale.—*Benth. Fl. Austral.* vii. 326. *S. fluitans* var. *terrestris*, *Benth. l.c.* 325. *S. crassiusculus*, *Cheesem. in Trans. N.Z. Inst.* xv. (1883) 300 (not of *Hook. f.*). *Isolepis lenticularis*, *R. Br. Prodr.* 222; *Hook. f. Fl. Tasm.* ii. 86, t. 145D. *Isolepis fluitans*, *Kirk in Trans. N.Z. Inst.* iii. (1871) 166 (not of *R. Br.*).

NORTH ISLAND: Auckland—North Cape Peninsula, *T. F. C.*; Waikato River, Lakes Whangape, Waikare, and Waihi, *Kirk! T. F. C.*; Lake Taupo, *Kirk!* swamps near the base of Ruapehu, *Berggren!* *H. Tryon!* *A. Hamilton!* *Petrie!* Sea-level to 2500 ft. December-March.

Also in eastern Australia and Tasmania, and very closely allied to the widely spread *S. fluitans*, L.

2. *S. basilaris*, *C. B. Clarke, MS.*—A dwarf species forming dense tufts 1-3 in. diam. Stems very short, $\frac{1}{8}$ - $\frac{1}{2}$ in. long, much branched at the base, leafy. Leaves far overtopping the stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, sheathing at the base, semiterete above, channelled in front, convex at the back, tip obtuse. Spikelets terminal, solitary or rarely 2 together, concealed amongst the leaves and sometimes almost radical, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, ovoid, obtuse, pale-green; bract long, leafy. Glumes broadly ovate, obtuse, with broad white membranous margins, and a stout green midrib which is usually produced into a thick excurrent tip. Stamens 2. Style-branches 2. Nut orbicular-obovoid, not angled nor trigonous, slightly compressed, obtuse, smooth but not polished, minutely dotted, light- or dark-brown.—*Isolepis basilaris*, *Hook. f. Handb. N.Z. Fl.* 302. *I. novæ-zealandiæ*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 102.

NORTH ISLAND: Hawke's Bay — Mud-banks by the Ngaruroro River, Colenso! Kirk! Petrie! SOUTH ISLAND: Westland — Jackson's, Teremakau River, Petrie! Otago — Not uncommon in the middle portion of the Clutha Valley, Roxburgh, Beaumont, Spear-grass Flat, Petrie! Pomahaka, Kirk! Sea-level to 2000 ft. November–March.

A curious little plant, in its usual state easily distinguished by the very short stems with the spikelets concealed by the leaves. But some forms have the stems more developed, and are then easily taken for small varieties of *S. aucklandicus*, which, however, has a very different nut.

3. *S. aucklandicus*, Boeck. in *Linnaea*, xxxvi. (1869–70) 491.—Forming compact grassy patches 2–6 in. diam. or more. Stems numerous, densely crowded, much branched at the base, stout or slender, striate, leafy at the base, 1–6 in. high. Leaves 2–6, equaling or longer than the stems, stout or slender, usually more or less coriaceous and rigid but sometimes almost flaccid, semiterete, convex on the back, grooved in front, tips obtuse. Spikelet solitary or rarely 2, small, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, broadly ovoid, varying in colour from dark chestnut-brown to pale whitish-green; bract very long, leafy, obtuse at the tip. Glumes few, ovate, obtuse, concave, often with a thick excurrent keel, very variable in colour. Stamens 3 or 2. Style-branches 3. Nut elliptic-ovoid, compressed, trigonous with the angles rounded, white or pale-yellow, smooth but not polished.—*Isolepis aucklandica*, Hook. f. *Fl. Antarct.* i. 88, t. 50; *Handb. N.Z. Fl.* 302. *Isolepis cartilaginea* var. *rigida*, Berggr. in *Minnesk. Fisiog. Sallsk. Lund.* (1877) n. viii. 23. *I. alpina*, Hook. f. *Fl. Tasm.* ii. 86 (in part).

Var. *subcucullata*, C. B. Clarke, MS.—Much more slender and diffuse. Stems weak, almost filiform; spikelet pale, solitary, 3–6-flowered. Glumes slightly hooded at the tip.—*Isolepis subcucullata*, Berggren l.c. 22, t. 5, f. 16–20.

NORTH ISLAND: Ruahine Mountains, Colenso! Rangipo Desert, Petrie! Ruapehu, Rev. F. H. Spencer. SOUTH ISLAND: Not uncommon in mountain-swamps throughout. STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Plentiful in moist places, descending to sea-level. December–March.

A variable plant. The typical state can be recognised without much difficulty by the dense leafy habit, the leaves frequently overtopping the stems, by the small usually solitary spikelets, and pale elliptic-ovoid nut. But lowland states, with a more slender and less leafy habit, are difficult to separate from *S. cernuus*. Other forms approach very closely to *S. antarcticus*. According to Mr C. B. Clarke, the species is also found in Tasmania and Amsterdam Island.

4. *S. cernuus*, Vahl. *Enum.* ii. 245.—Stems densely tufted, very slender, quite glabrous, 2–6 in. high, rarely more. Leaves setaceous, 1–3 near the base of the stem and shorter than it. Spikelets solitary or 2–3 together, ovoid or oblong-ovoid, $\frac{1}{10}$ – $\frac{1}{5}$ in. long; bract variable in length, usually exceeding the spikelets, continuous with the stem so that the spikelets appear to be lateral. Glumes 6–15, broadly ovate, concave or obscurely keeled, obtuse or with a short

point, green or chestnut-brown. Stamens 3, rarely 2 or 1. Style-branches 3, long, linear. Nut about half the length of the glume, trigonous, obovoid, obtuse, minutely apiculate, not longitudinally ribbed, the surface appearing to be minutely reticulate from the numerous subquadrate cells.—*S. Savii*, *Sebast. and Mauri, Prodr. Fl. Rom.* 22. *S. riparius*, *Poir. Encycl. Suppl.* v. 103; *Benth. Fl. Austral.* vii. 327. *Isolepis riparia*, *R. Br. Prodr.* 222; *Hook. f. Fl. Tasm.* ii. 89, t. 145c; *Handb. N.Z. Fl.* 302. *I. setacea*, *Hook. f. Fl. Nov. Zel.* i. 271, in part (not of *R. Br.*). *I. setosa*, *Raoul, Choix*, 40.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS: Abundant throughout. Sea-level to 2000 ft. November–February.

Nearly cosmopolitan, being found in all temperate and tropical countries except south-eastern Asia. In New Zealand there are two principal forms: one, which is usually littoral, has the stems rather stiff, the spikelets usually solitary and often chestnut-brown, and the nut broadly obovoid; the other is more slender, the spikelets are paler, and the nut much smaller, more elliptical, and more acutely trigonous.

5. *S. antarcticus*, *Linn. Mant.* ii. 181.—Densely tufted, very variable in size, sometimes $\frac{1}{2}$ – $1\frac{1}{2}$ in. high, stout, rigid, cartilaginous; at other times taller and more slender, 3–6 in. high or more. Leaves 1 or several at the base of the stem and shorter than it, obtuse at the tip, rigid and coriaceous in the smaller forms, softer and more grassy in the larger ones. Heads solitary, terminal, of 1–4 spikelets in the small stout forms, of 3–9 in the larger ones; bracts $\frac{1}{4}$ –1 in. long, usually far exceeding the head. Spikelets rather stout, ovoid-oblong, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, many-flowered. Glumes broadly ovate, boat-shaped with a prominent keel, obtuse or the keel produced into a short point, often rigid and coriaceous, pale whitish-yellow with a conspicuous dark chestnut-brown spot; sides broad, marked with prominent curved lines; back often curved. Hypogynous scales wanting. Stamens 3 or 2, rarely 1. Style-branches 3. Nut rather more than half as long as the glume, elliptic-ovoid, trigonous, acute, minutely punctate, white to yellow, sometimes ultimately almost black.—*C. B. Clarke in Fl. Cap.* vii. 223. *S. cartilagineus*, *Poir. Encycl. Suppl.* v. 103; *Benth. Fl. Austral.* vii. 328. *S. ebenocarpus*, *Kirk in Trans. N.Z. Inst.* xvii. (1885) 224. *Isolepis cartilaginea*, *R. Br. Prodr.* 222; *Hook. f. Fl. Nov. Zel.* i. 271; *Fl. Tasm.* ii. 88, t. 145; *Handb. N.Z. Fl.* 302.

NORTH ISLAND: *Hawke's Bay*—*Colenso!* *A. Hamilton!* *Wellington*—*Karioi*, *Kaiwarawara*, *Kirk!* SOUTH ISLAND: *Nelson*—*Cape Farewell*, *Kirk!* *Canterbury*—*Burnham*, *Kirk!* *Springfield*, *T. F. C.* *Otago*—*Catlin's River*, *Petrie!* *Lake Wakatipu*, *Kirk!* *Bluff Hill*, *Kirk!* STEWART ISLAND: *Port Pegasus*, *Petrie!* *Kirk!* Sea-level to 2000 ft. November–March.

Also in extratropical Australia, South Africa, and St. Helena.

6. **S. inundatus**, *Poir. Encycl. Suppl.* v. 103.—Very variable in size and habit of growth. Stems 2–12 in. high, often small, slender and filiform, at other times stouter and taller, and resembling small states of *S. sulcatus* and *S. prolifer*. Leaves 1 or rarely 2 at the base of the stem, or reduced to a short and broad sheath. Heads solitary, terminal, of 2–15 crowded spikelets, often proliferous and putting out 1 or several short or long branches ending in a smaller head of spikelets; bract very variable in length. Spikelets $\frac{1}{10}$ – $\frac{1}{4}$ in. long, ovate or ovate-oblong, subacute, pale or dark chestnut-brown, many-flowered. Glumes broadly ovate, concave or keeled at the back, obtuse or subacute, the sides usually more or less stained or striate with dark red-brown, the keel usually pale. Stamen 1. Style-branches 3, long, linear. Nut about half the length of the glume, oblong-obovoid, equally and conspicuously trigonous, with a small conical point, not longitudinally ribbed, white, smooth but not polished.—*Benth. Fl. Austral.* vii. 329. *S. reticularis*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 277. *Isolepis inundata*, *R. Br. Prodr.* 222. *I. prolifer*, *Hook. f. Handb. N.Z. Fl.* 301; *Fl. Tasm.* ii. 87, t. 144 (not of *R. Br.*). *I. setacea*, *Hook. f. Fl. Nov. Zel.* i. 271, in part (not of *R. Br.*).

Var. **major**.—Stems tall and stout, 5–12 in. high, usually leafless. Spikelets more numerous, 6–15, densely compacted. Glumes obtuse. Approaches small forms of *S. sulcatus*, but is at once distinguished by the smaller acutely trigonous nut.

Var. **gracillima**.—Stems slender, often filiform, 2–6 in. long. Spikelets 2–6, flattened. Glumes often subacute.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 3000 ft. November–March.

As defined above, this varies so much in habit and other respects as to give rise to the suspicion that more species than one are included in it; but I have failed to find valid distinguishing characters. It extends through Australia to the Malay Archipelago, and is also abundant in temperate South America.

7. **S. sulcatus**, *Thouars, Esquisse Fl. Trist.* 36, t. 7; var. **distigmatica**, *C. B. Clarke, MS.*—Stems numerous, tufted, 8–16 in. high, stout, grooved when dry, leafless except a large purple or purplish-black sheath at the base. Heads solitary, terminal, of 6–20 densely packed spikelets, often proliferous and emitting 1 or several branches ending in a smaller head of spikelets; bract variable in length. Spikelets rather short, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, oblong, obtuse, many-flowered. Glumes broadly ovate, obtuse, concave, dark chestnut-brown with a green keel and pale margins. Hypogynous bristles wanting. Stamens usually 1. Style-branches 2, rarely 3, long, linear. Nut about half the length of the glume, obovoid, plano-convex, the convex side not keeled, smooth and polished, shining, white or pale yellowish-white.—*Isolepis prolifer*, *Hook. f. Fl. Nov. Zel.* i. 271, for the most part (not of *R. Br.*, nor of *Hook. f. Handb. N.Z. Fl.* 301).

NORTH AND SOUTH ISLANDS: Apparently common: Auckland—Hokianga, *Berggren*; Whangarei, *H. Carse*! vicinity of Auckland, *Petrie*! *T. F. C.*; Rotorua, *Cartwright*, *Petrie*! *T. F. C.*; Taupo, *Kirk*! Hawke's Bay—Norsewood, *Colenso*! Wellington—Murimotu, *Petrie*! Canterbury—Styx River, *Petrie*! Sea-level to 2000 ft. November–March.

For the identification of this plant with the Tristan d'Acunha *S. sulcatus* I am indebted to Mr. C. B. Clarke, who, however, maintains it as a distinct variety, characterized by the usually 2-fid style and plano-convex nut not keeled on the convex face. Large stout forms of *S. inundatus* approach it very closely, but in fruit are easily distinguished by the 3-fid style and acutely trigonous nut. *S. prolifer*, which has precisely the same habit of growth, can always be separated by the long linear spikelets, 3 stamens, and small acutely trigonous nut.

8. *S. prolifer*, *Rottb. Descr. et Ic.* 55, t. 17, f. 2.—Stems numerous, tufted, 1–2 ft. high or more, rather stout, striate when dry, leafless except a large purplish or purplish-black sheath at the base. Heads large, $\frac{1}{2}$ –1 in. diam., terminal, solitary, of very many (10–30) densely crowded spikelets, often proliferous and putting out 1 or several usually long branches terminating in a much smaller head of spikelets; bract shorter than the head, obtuse. Spikelets long and narrow, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, linear or linear-oblong, cylindrical, obtuse, many-flowered. Glumes ovate, obtuse, concave, chestnut-brown with a paler keel and margins. Hypogynous bristles wanting. Stamens 3. Style-branches 3, long, linear. Nut rather small, less than half the length of the glume, elliptic-ovoid, acute, acutely trigonous, smooth, pale yellowish-brown or almost white.—*Benth. Fl. Austral.* vii. 330. *Isolepis prolifer*, *R. Br. Prodr.* 223. *I. globosa*, *Buch. in Trans. N.Z. Inst.* iii. (1871) 211.

NORTH ISLAND: Auckland—Bay of Islands, *Kirk*! Wellington—Karori, Evans Bay, and other localities in the vicinity of the City of Wellington, *Buchanan*! *Kirk*! *Petrie*! Wairarapa, *Kirk*! November–March.

Also in New South Wales, and abundant in South Africa. Easily separated from *S. sulcatus* and large states of *S. inundatus* by the very numerous long and narrow spikelets, and flowers with 3 stamens.

9. *S. nodosus*, *Rottb. Descr. et Ic.* 52, t. 8, f. 3.—Rhizome short, stout, woody, creeping, $\frac{1}{4}$ in. diam. or more. Stems very numerous, closely packed, 1–3 ft. high, erect, rigid, terete or slightly compressed. Leaves wanting except 2 or 3 sheathing scales at the base of the stems. Head solitary, globose, brown, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam., of very numerous densely crowded spikelets; bract $\frac{1}{2}$ –1½ in. long, rigid, erect, continuous with the stem, so that the head appears lateral. Spikelets ovoid, $\frac{1}{5}$ – $\frac{1}{6}$ in. long, many-flowered. Glumes broadly ovate, obtuse or obscurely mucronate, concave. Hypogynous bristles wanting. Stamens 3. Style-branches 3, linear. Nut less than $\frac{1}{2}$ the length of the glume, obovoid, obtusely trigonous, the flat face next the glume, pale-brown, smooth and polished.—*Benth. Fl. Austral.* vii. 331. *Isolepis nodosa*, *R. Br.*

Prodr. 221; *A. Rich. Fl. Nouv. Zel.* 104; *A. Cunn. Precur.* n. 272; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 270; *Handb. N.Z. Fl.* 301.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 2000 ft. November–February.

Also found in Norfolk Island and Lord Howe Island, temperate Australia, extratropical South Africa, St. Helena and Amsterdam Islands, and temperate South America.

10. **S. frondosus**, *Banks and Sol. ex Boeck. in Flora*, lxi. (1878) 141.—Stout, rigid, harsh, yellow-green, 2–3 ft. high. Rhizome thick, woody, creeping, often many feet in length. Stems many along the rhizome, stout, erect, obtusely trigonous, leafy at the base. Leaves very numerous, spreading, often curved, rigidly coriaceous, channelled above, keeled beneath, gradually narrowed into long trigonous points, at the base expanded into broad membranous sheaths; margins and keel sharply denticulate. Inflorescence 3–9 in. long or more, of linear clusters of densely crowded sessile spikelets arranged in a spiral manner around the upper part of the stem, each cluster subtended by a rigid linear bract similar to the leaves. Spikelets red-brown, almost globose, about $\frac{1}{2}$ in. long, many-flowered. Glumes broadly ovate, obtuse, concave, shining, striate. Hypogynous bristles wanting. Stamens 3; anthers with a long awn. Style-branches 3. Nut broadly obovoid, compressed, quite smooth.—*Isolepis spiralis*, *A. Rich. Fl. Nouv. Zel.* 105, t. 19; *A. Cunn. Precur.* n. 274; *Raoul, Choix*, 40. *Desmoschœnus spiralis*, *Hook. f. Fl. Nov. Zel.* i. 272; *Handb. N.Z. Fl.* 303. *Anthophyllum Urvillei*, *Steud. Cyp.* 160.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant on sand-dunes from the North Cape to Otago. *Pingao*. November–February.

The leaves were formerly used by the Maoris for making kits, and occasionally for cloaks, which were said to be very durable.

11. **S. americanus**, *Pers. Syn.* i. 68.—Rhizome creeping. Stems rather slender, 1–2 ft. high, acutely trigonous. Leaves 1–4, always shorter than the stem; sheaths long. Head small, of 1–4 closely compacted sessile spikelets; bract 1–2 in. long, erect, angular, continuous with the stem so that the head appears lateral. Spikelets broadly ovoid, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, dark-brown, many-flowered. Glumes broadly ovate, membranous, concave, tip emarginate with usually a short awn in the notch, margins scarious above. Hypogynous bristles 4–6, shorter than the nut. Stamens 3. Style-branches 2–3. Nut rather large, $\frac{2}{3}$ the length of the glume, obovoid, plano-convex, pale-brown, smooth.—*S. pungens*, *Vahl. Enum.* ii. 255; *Benth. Fl. Austral.* vii. 333. *S. triqueter*, *R. Br. Prodr.* 223; *Hook. f. Fl. Nov. Zel.* i. 269; *Handb. N.Z. Fl.* 300 (not of *Linn.*). *S. novæ-zealandiæ*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 277.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Brackish-water swamps from Hokianga to Foveaux Strait, but often local. Inland at Roxburgh, Otago, *Petrie!* November–February.

Not uncommon in temperate Australia and Tasmania, North and South America, and southern Europe.

12. **S. lacustris**, *Linn. Sp. Plant.* 48.—Rhizome stout, creeping, with numerous perpendicular rootlets. Stems 2–6 ft. high, sometimes almost as thick as the finger, terete, spongy, glaucous. Leaves wanting, or the uppermost sheath with a very short flat lamina. Inflorescence a terminal simple or compound cymose umbel 2–4 in. across; rays few, stout, irregular; bract shorter than the umbel, continuous with the stem. Spikelets numerous, ovoid or oblong, $\frac{1}{3}$ in. long, brownish, many-flowered. Glumes broadly ovate, membranous, concave, notched at the tip with a small point in the notch, margins fringed. Hypogynous bristles 5–6, linear, retrorsely scabrid, usually equalling the nut. Stamens 3. Style-branches 3 or 2. Nut more than half as long as the glume, obovoid, compressed, plano-convex, pale-brown, smooth.—*A. Rich. Fl. Nouv. Zel.* 103; *A. Cunn. Precur.* n. 275; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 269; *Handb. N.Z. Fl.* 300; *Benth. Fl. Austral.* vii. 333.

NORTH AND SOUTH ISLANDS: Margins of lakes and ponds from the North Cape southwards to the north of Otago and Okarito, common. Sea-level to 1500 ft. November–February.

Generally distributed in all temperate and warm countries, except South America.

13. **S. maritimus**, *Linn. Sp. Plant.* 74.—Rhizome woody, creeping, the nodes often dilated into hard tubers. Stems stout, sharply triangular, 1–3 ft. high or more. Leaves from near the base of the stem and often exceeding it, broad, flat, grassy. Inflorescence an irregular terminal umbel of few unequal rays, often contracted into a compact cluster; bracts 3–4, 3–9 in. long, similar to the leaves. Spikelets $\frac{1}{2}$ – $\frac{3}{4}$ in. long, sessile or peduncled, ovoid or cylindric, brown, many-flowered. Glumes ovate, membranous, 2-lobed at the tip with a short intermediate awn, usually pubescent towards the tip. Hypogynous bristles 3–6, shorter than the nut, retrorsely scabrid. Stamens 3. Style-branches 3 or 2, long, linear. Nut less than one-half the length of the glume, broadly obovoid, compressed, flat on one side, convex or obtusely angled on the other, smooth and polished, brown when fully ripe.—*Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 269; *Handb. N.Z. Fl.* 300.

Var. **fluviatilis**, *Torr. in Ann. Lyceum New York*, iii. (1836) 324.—Taller and stouter, 3–6 ft. high. Leaves broader, $\frac{1}{2}$ in. diam. or more; bracts longer. Umbel larger, more often compound; rays 3–9. Spikelets large, pale-brown. Style-branches 3. Nut narrower, oblong-obovoid, trigonous, conspicuously beaked, white or pale-brown, opaque, polished.—*Benth. Fl. Austral.* vii. 335. *S. fluviatilis*, *Asa Gray, Man. Bot. U.S.* 500.

Var. **macrostachya**, Michx. *Fl. Bor. Amer.* v. 32.—Umbels simple or compound. Spikelets large, sometimes over 1 in. long. Style-branches almost always 2. Nut large, broadly obovoid, flat on one side and obscurely angled on the other, white or pale-brown, opaque, not polished.—*Asa Gray, Man. Bot. U.S.* 500.

NORTH AND SOUTH ISLANDS: The two varieties not uncommon in brackish-water swamps and on the banks of lakes and streams from the North Cape to Otago Harbour. November–February.

In the North Island var. *fluviatilis* extends inland along most of the larger rivers, ascending the Waikato as far as Lake Taupo. Var. *macrostachya* seems to be chiefly found in brackish-water swamps. Both varieties are abundant in North America, and also in Australia and Tasmania. According to Mr. C. B. Clarke, the typical form of the species has not yet been observed in either Australia or New Zealand.

7. CARPHA, R. Br.

Perennial herbs. Leaves crowded at the base of the stem, usually shorter than it. Spikelets numerous, narrow, 1-flowered, arranged in a terminal corymb or panicle, sometimes contracted into a more or less dense head. Glumes usually 4, distichous; the 2 lowest small, empty; the third large, also empty; the uppermost about the same size, with a single hermaphrodite flower in its axil. Hypogynous bristles 6, plumose, much enlarged in fruit and exceeding the glumes. Stamens 3. Style-branches 3. Nut oblong, 3-angled, narrowed above into the persistent and hardened base of the style.

In addition to the New Zealand species, which is also found in Tasmania, Victoria, and on the mountains of New Guinea, there is another closely allied one in Chili and Fuegia.

1. **C. alpina**, R. Br. *Prodr.* 230.—A tufted grass-like herb 3–12 in. high. Leaves usually shorter than the stems, numerous, narrow-linear, rigid, obtuse at the tip, flat or concave, grooved, dilated at the base into broad membranous sheaths. Spikelets $\frac{1}{3}$ – $\frac{1}{2}$ in. long, lanceolate, compressed, arranged in a corymbose manner at the top of the stem, in small specimens crowded into a head. Bracts leafy, usually exceeding the inflorescence. Glumes rigidly membranous, linear-oblong, pale, shining, concave. Hypogynous bristles very large, in the fruiting stage exceeding the glumes, conspicuously plumose for their whole length. Nut narrow-oblong, prismatic, tipped by the long hardened base of the style.—*Hook. f. Fl. Nov. Zel.* i. 273; *Fl. Tasm.* ii. 84; *Handb. N.Z. Fl.* 299; *Benth. Fl. Austral.* vii. 381, and in *Hook. Ic. Plant.* t. 1216.

NORTH ISLAND: Mountain districts from Moehau (Cape Colville) and the East Cape southwards. SOUTH ISLAND, STEWART ISLAND: Abundant in hilly and mountain districts throughout. AUCKLAND ISLANDS: Carnley Harbour, *Kirk!* Usually from 2500 to 5000 ft., but descends to sea-level in Stewart Island. December–February.

8. **SCHŒNUS**, Linn.

Usually perennial herbs, of very various habit, stout, erect and rush-like, or slender and diffuse, rarely creeping. Leaves near the base of the stem or cauline, sometimes reduced to sheathing scales. Spikelets compressed, few-flowered, panicle or capitate or fascicled. Glumes more or less distichous, 3 or more outer ones empty, 1-4 succeeding ones hermaphrodite and fruit-bearing, uppermost male or empty; rhachilla elongated and flexuose between the flowering glumes, with the flowers seated in the alternate notches. Hypogynous bristles present or wanting. Stamens usually 3, rarely fewer or 4-6. Style slender, sometimes slightly thickened near the base; style-branches 3. Nut obovoid, ovoid, or oblong, trigonous.

A large genus of about 60 species, mainly from Australia and New Zealand, but a few are widely distributed in the temperate regions of the Northern Hemisphere and 2-3 are Malayan. Of the 7 species found in New Zealand, 3 are endemic, the remaining 4 extend to Australia and Tasmania.

* Stems densely tufted, erect, terete, rush-like. Leaves either reduced to appressed sheaths or a short erect lamina alone present. Spikelets in a narrow terminal panicle.

- | | |
|---|----------------------------|
| Stems 1-2 ft., rather stout. Spikelets many, $\frac{1}{3}$ - $\frac{1}{2}$ in. long.
Hypogynous bristles wanting. Nut trigonous, faces
transversely rugose | 1. <i>S. brevifolius</i> . |
| Stems 1-3 ft., slender. Spikelets few or many, $\frac{1}{4}$ in. long.
Hypogynous bristles present, equalling the nut or shorter
than it. Nut obovoid, smooth | 2. <i>S. Tendo</i> . |
| Stems 1-2½ ft., very slender. Spikelets many, $\frac{1}{4}$ - $\frac{1}{3}$ in.
Hypogynous bristles wanting. Nut oblong, obtuse, not
trigonous, white | 3. <i>S. Carsei</i> . |
| Stems 1-3 ft., slender. Spikelets few (2-8), $\frac{1}{4}$ in. Hypo-
gynous bristles present, very long. Nut elliptic, trigonous,
pale-brown | 4. <i>S. pauciflorus</i> . |

** Stems shorter, not so rigid, often diffuse. Leaves well developed. Spikelets fascicled or umbelled, sometimes solitary.

- | | |
|---|--------------------------|
| Stems 2-6 in., creeping or diffuse. Leaves alternate,
spreading. Spikelets 1-3 in the axils of the leaves | 5. <i>S. axillaris</i> . |
| Stems 6-14 in., slender, diffuse. Leaves mostly at the base
of the stems, linear. Spikelets in irregular umbels or
fascicles | 6. <i>S. apogon</i> . |
| Stems 1-12 in., slender, wiry, rigid. Leaves few at the
base of the stems. Spikelets sessile in a dense head,
sometimes few or solitary | 7. <i>S. nitens</i> . |

1. *S. brevifolius*, R. Br. Prodr. 231.—Rhizome short, stout, creeping. Stems rush-like, densely tufted, rigid, erect, terete, smooth and polished, 1-2 ft. high. Leaves reduced to 3 or 4 dark red-brown appressed sheaths at the base of the stem, the uppermost of which has a short rigid erect subulate lamina $\frac{1}{2}$ -1 in. long. Panicle narrow, 3-8 in. long; branches slender, erect; bracts at the base with appressed sheaths and a short erect lamina. Spikelets lanceolate, compressed, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, 2-3-flowered, red-brown.

Glumes 6-9, distichous, ovate-lanceolate, acute, concave, nerveless; margins ciliate; the 4-6 outer smaller and empty. Hypogynous bristles wanting. Stamens usually 2. Style-branches 3. Nut small, turgid, obovoid, trigonous with the angles thickened. faces transversely rugose.—*Benth. Fl. Austral.* vii. 370. *S. tenax*, *Hook. f. Handb. N.Z. Fl.* 298. *Chætospora tenax*, *Hook. f. Fl. Nov. Zel.* i. 273.

NORTH ISLAND: From the North Cape to Cook Strait, but rare and local to the south of Rotorua. SOUTH ISLAND: Nelson—Aorere Valley, *Kirk!* Sea-level to 1500 ft. December-January.

Also in extratropical Australia.

2. **S. Tendo**, *Banks and Sol. ex Hook. f. Handb. N.Z. Fl.* 298.—Rhizome stout, creeping. Stems much more slender than in *S. brevifolius*, 1-3 ft. high, rigid, deeply grooved throughout their length. Leaves reduced to 2-3 dark chestnut-brown or almost black sheaths at the base of the stem, the uppermost produced into a subulate lamina $\frac{1}{4}$ – $\frac{1}{2}$ in. long; the mouths of the sheaths fringed with cobwebby hairs. Panicle slender, narrow, 2-8 in. long; branches short, slender, erect. Spikelets linear-lanceolate, compressed, 2-4-flowered, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, dark-brown or almost black. Glumes 8-10, distichous, ovate-lanceolate, acute, concave, keeled, nerveless except the midrib; margins ciliate; the 5-6 outer smaller and empty. Hypogynous bristles 3-6, short, slender, sometimes not equalling the nut. Stamens 2. Style-branches usually 2. Nut obovoid, unequally and obliquely biconvex, quite smooth, white.—*Chætospora Tendo*, *Hook. f. Fl. Nov. Zel.* i. 273.

NORTH ISLAND: Abundant on clay hills from the North Cape to Hawke's Bay and Taranaki. SOUTH ISLAND: Nelson—Aorere Valley, *Kirk.* Sea-level to 2000 ft. October-January.

Easily distinguished from the preceding species by the more slender grooved stems, smaller darker spikelets, the presence of bristles, and by the smooth biconvex nut.

3. **S. Carsei**, *Cheesem. n. sp.*—Rhizome short, stout, creeping, clothed with chestnut-brown scales. Stems densely tufted, very slender, 1-2½ ft. high, terete, grooved. Leaves reduced to 2-3 chestnut-brown sheaths at the base of the stem, produced at the tip into an erect subulate lamina $\frac{1}{2}$ –2 in. long; the mouths of the sheaths oblique, glabrous. Panicle slender, narrow, 2-6 in. long; branches filiform, erect; bracts at the base with appressed sheaths, and a short erect lamina. Spikelets numerous, compressed, very narrow, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, linear-lanceolate, acute, brownish. Glumes 5-7, distichous, closely imbricate, ovate-lanceolate, acuminate, concave, keeled, thin and membranous, nerveless; the 3-4 outer empty. Hypogynous bristles wanting. Stamens 3. Style-branches 3. Nut oblong, obtuse at both ends, not trigonous, smooth, white.

NORTH ISLAND: Auckland—Swamps at Whangarei and between the Manukau Harbour and the Waikato River, *H. Carse*! Papatoetoe, *Kirk*! Taranaki—Ngaire Swamp, *T. F. C.* January–March.

This seems to have been confounded with *S. pauciflorus*, but differs from that species in the shorter leaves, longer panicle with numerous spikelets, in the absence of bristles, and in the nut. It is probably common in lowland swamps.

4. *S. pauciflorus*, *Hook. f. Handb. N.Z. Fl.* 298.—Rhizome short, stout, branched at the tip. Stems densely tufted, very slender, deeply grooved, 1–3 ft. high, green or purplish-red. Leaves reduced to 2–4 dark chestnut-brown or almost black sheaths at the base of the stem, the uppermost of which is produced into an erect almost filiform lamina 1–3 in. long; the mouths of the sheaths oblique, glabrous. Panicle small, $\frac{3}{4}$ –2 in. long, of 2–8 spikelets; bracts usually 2, overtopping the panicle. Spikelets lanceolate, compressed, $\frac{1}{4}$ in. long, 2–4-flowered, varying in colour from whitish to dark chestnut-brown. Glumes 4–6, distichous, ovate-lanceolate, acuminate, keeled, nerveless except the midrib; margins glabrous; the 3 outer slightly smaller, empty. Hypogynous bristles 6, filiform, almost equalling the style. Stamens 3. Style-branches 3. Nut elliptic-oblong, trigonous with the angles thickened, smooth, polished, pale-brown.—*Chætospora pauciflora*, *Hook. f. Fl. Nov. Zel.* i. 273.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: An abundant mountain-plant from Lake Taupo southwards. 1500–5000 ft. December–March.

This hardly differs from the Chilian *Chætospora antarctica*, *Hook. f.*, except in the much shorter leaves.

5. *S. axillaris*, *Poir. Encycl. Suppl.* ii. 251.—Stems very slender, pale-green, flaccid, leafy, branched, creeping or diffusely spreading, often intricate, 2–6 in. long or more. Leaves alternate, spreading, $\frac{1}{2}$ –1 in. long, very narrow-linear, obtuse, flat or nearly so, flaccid. Spikelets 1–3 together in the axils of the leaves, sessile or shortly peduncled, about $\frac{1}{10}$ in. long, compressed, pale-brown, 1–2-flowered. Glumes distichous, lanceolate, subacute, keeled; the 2 or 3 outer empty and smaller. Hypogynous bristles 6, rarely fewer, longer than the nut. Stamens 3. Style-branches 3. Nut very small, elliptic-obovoid, obtusely trigonous, quite smooth, white or greyish-white.—*Hook. f. Handb. N.Z. Fl.* 298; *Benth. Fl. Austral.* vii. 375. *Chætospora axillaris*, *R. Br. Prodr.* 233; *Hook. f. Fl. Nov. Zel.* i. 274, t. 62A; *Fl. Tasm.* ii. 82. *Scirpus foliatus*, *Hook. f. in Lond. Journ. Bot.* iii. 1844, 414.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: From the North Cape southwards, abundant in the North Island, less plentiful in the South Island. Sea-level to 2500 ft. November–March.

Easily recognised by the slender creeping or diffuse habit, leafy stems, spikelets in twos or threes in the axils of the leaves, and small white nut. Also common in extratropical Australia and Tasmania.

6. **S. apogon**, *Roem and Schult. Syst.* ii. 77.—Stems very numerous, crowded, weak, slender, sometimes almost filiform, grooved, leafy at the base, 6–14 in. long. Leaves much shorter than the stems, narrow-linear, acute, almost flaccid, channelled in front, convex and striate on the back. Spikelets linear-lanceolate, chestnut-brown or almost black, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, 1–3-flowered, few or many together in irregular more or less compact umbels or heads, which are both terminal and lateral from the upper leaf-sheaths; bracts leafy. Glumes distichous, oblong-lanceolate, acute, keeled, almost black with narrow pale margins; the 3 outer empty, usually much smaller. Hypogynous bristles 6, not much exceeding the nut. Stamens 3. Style-branches usually 3. Nut small, broadly oblong-obovoid, obtusely trigonous, conspicuously reticulated, white.—*S. Brownii*, *Hook. f. Handb. N.Z. Fl.* 298; *Benth. Fl. Austral.* vii. 373. *Chætospora imberbis*, *R. Br. Prodr.* 233; *Hook. f. Fl. Nov. Zel.* i. 274; *Fl. Tasm.* ii. 82.

Var. **laxiflorus**, *C. B. Clarke*.—Stems very slender, lax, sometimes 2 ft. long. Inflorescence much more lax; clusters mostly lateral; spikelets often long-peduncled.—*S. laxiflorus*, *Steud. Cyp.* 166. *S. vacillans*, *Kirk in Trans. N.Z. Inst.* x. (1878) 421.

NORTH ISLAND: Auckland—Mongonui, *T. F. C.*; Puhipuhi, *Kirk*; Whangarei, *Carse*! vicinity of Auckland, *T. F. C.*, *Petrie*! East Coast, *Colenso*! Var. *laxiflorus*: Between Taheke and Opanake, *Petrie*! ravines near the base of Mount Wynyard, *Kirk*! between Te Aroha and Katikati, *Adams*! Taranaki—White Cliffs, *T. F. C.* SOUTH ISLAND: Canterbury—Kowai Pass, *Kirk*! (the typical form). Sea-level to 2000 ft. December–March.

Common in eastern Australia, from Queensland to Tasmania.

7. **S. nitens**, *Poir. Encycl. Suppl.* ii. 251.—Rhizome slender, creeping. Stems densely tufted, slender, wiry, grooved, leafy at the base, 2–12 in. high. Leaves few, shorter than the stems, semiterete, deeply channelled in front, grooved on the back; sheaths chestnut-brown or blackish-brown, shining, grooved. Inflorescence a terminal head of 1–15 densely crowded and sessile spikelets; bracts $\frac{1}{2}$ –1 in. long, exceeding the spikelets, continuous with the stem, so that the head appears lateral. Spikelets ovoid to lanceolate-ovoid, somewhat turgid, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, 2- or more rarely 3-flowered, chestnut-brown to blackish-brown. Glumes 4–6, obscurely distichous, broadly ovate, obtuse, concave, keeled, shining; the 2 or rarely the 3 outer smaller and empty. Hypogynous bristles 6, usually longer than the nut, plumose at the base with long hairs. Stamens 3. Style-branches 3. Nut ovoid, obscurely trigonous, smooth and shining, pale-brown to dark-brown.—*Hook. f. Handb. N.Z. Fl.* 299; *Benth. Fl. Austral.* vii. 362. *S. Moorei*, *Kirk in Trans. N.Z. Inst.* xiii. (1881) 384 (not of *Benth.*). *Chætospora nitens*, *R. Br. Prodr.* 233; *Hook. f. Fl. Nov. Zel.* i. 274; *Fl. Tasm.* ii. 82. *Scirpus nitens*, *Boeck. in Linnæa*, xxxvi. (1869–70) 696.

Var. **concinus**.—Smaller, more rigid and wiry, 1-3 in. high. Spikelets solitary or rarely 2 together, slightly compressed, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, dark-brown or almost black. Nut rather larger, broadly ovoid, trigonous, sometimes scabrid at the tip.—*S. concinns*, Hook. f. *Handb. N.Z. Fl.* 299. *Chætophora concinna*, Hook. f. *Fl. Nov. Zel.* i. 274, t. 62, f. B.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Lake Taupo southwards, but often local. Sea-level to 2500 ft. December–March.

A most variable plant. Hooker's *S. concinns* appears to me to be a depauperated state connected with the type by numerous intermediates, and I have consequently followed Mr. C. B. Clarke in reducing it to *S. nitens*. The typical form is not uncommon in Australia, ranging from Queensland to Tasmania and Western Australia.

9. CLADIUM, P. Browne.

Perennial herbs. Stems stout or slender, terete or compressed, sometimes leafy throughout, sometimes at the base only, or the leaves reduced to sheathing scales. Leaves terete or compressed, more rarely vertically flattened and equitant at the base. Inflorescence paniculate. Spikelets numerous, rarely few, 1-3- or rarely 4-6-flowered, the lowest flower always perfect and fruit-bearing. Glumes imbricate all round, 1-4 outer empty, smaller than the succeeding flowering ones. Hypogynous bristles usually wanting. Stamens 3. Style long, linear; base often dilated but continuous with the nut; style-branches 3, rarely 2. Nut ovoid or oblong, terete or obscurely trigonous or tricostate, smooth, crowned by the adnate base of the style.

Species between 40 and 50, widely distributed, but more plentiful in the Southern Hemisphere than in the Northern. Of the 10 species found in New Zealand, 6 extend to Australia and Tasmania, 3 of them being also found in the Pacific islands or eastern Asia, the remaining 4 are endemic.

- A. *Vincentia*. Spikelets with 2-4 perfect flowers. Nut stipitate, triquetrous, narrowed upwards into a long cuspidate beak.

Tall, 2-5 ft. Stems and leaves flattened, the latter $\frac{1}{2}$ –1 in.

broad. Panicle very large, lax, drooping 1. *C. Sinclairii*.

- B. *Baumea*. Spikelets with 1 or rarely 2 perfect flowers. Nut sessile, often tumid at the apex, not narrowed into a cuspidate beak.

* Spikelets usually 2-3-flowered, 1 or sometimes 2 of the flowers perfecting fruit.

Stems and leaves flattened, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad. Panicle 6-12 in., narrow. Nut ovoid, trigonous

2. *C. complanatum*.

Stems and leaves stout, terete, transversely septate.

Panicle very large and broad, drooping. Nut obovoid, trigonous

3. *C. articulatum*.

Stems and leaves slender, terete, not septate. Panicle narrow, erect, 3-10 in. long, interrupted; bracts spathaceous. Nut reddish-yellow, trigonous

4. *C. glomeratum*.

Stems and leaves slender, terete, not septate. Panicle narrow, 10-18 in.; branches drooping. Nut pale

5. *C. Huttoni*.

** Spikelets 1- or rarely 2-flowered, never more than one flower perfecting fruit.

- Stems and leaves slender, terete. Panicle 2-6 in. long, stiff, dense; bracts small. Nut small, oblong-orbicular 6. *C. teretifolium*.
 Stems very slender, terete. Leaf solitary and long, or reduced to sheathing scales. Panicle 6-18 in. long, slender. Nut ovoid, smooth; tip large, tumid .. 7. *C. Gunnii*.
 Stems terete. Leaves reduced to sheathing scales. Panicle short, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long. Nut obtusely trigonous, tip small, puberulous 8. *C. junceum*.
 Stems stout, tetragonous. Leaves like the stems, short, often reduced to sheathing scales. Panicle contracted into a spike $\frac{1}{2}$ - $\frac{1}{2}$ in. long. Hypogynous bristles present.. 9. *C. Vanthiera*.
 Stems filiform. Leaves reduced to sheathing scales. Panicle short, $\frac{1}{2}$ - $\frac{3}{4}$ in. long; spikelets 3-7. Nut with a persistent style-base as long as itself 10. *C. capillaceum*.

1. *C. Sinclairii*, Hook. f. *Handb. N.Z. Fl.* 305.—Stems tall, leafy, quite flat, smooth, 2-5 ft. high, $\frac{1}{4}$ in. diam., forming large clumps. Leaves 2-4 ft. long, distichous and equitant at the base, acuminate, quite flat, $\frac{1}{2}$ -1 in. broad, pale-green, smooth, striate; margins thin, even. Panicle large, terminal, nodding, excessively branched, 9-12 in. long or more; bracts sheathing, 2-edged; branches drooping. Spikelets innumerable, rich dark red-brown, fascicled, $\frac{1}{6}$ in. long, 2-3-flowered, the lower flower usually alone fertile. Glumes usually 5, ovate-lanceolate, acuminate or almost awned, minutely scabrid-pubescent, 2 or 3 outer empty. Hypogynous bristles wanting. Stamens 3, elongating after flowering. Style-branches 3. Nut small, red-brown, fusiform, trigonous, conspicuously narrowed at the base, and also upwards into a triquetrous minutely scabrid beak. *C. gahnioides*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 340. *Vincentia anceps*, Hook. f. *Fl. Nov. Zel.* i. 276. *V. gladiata*, Boeck. in *Linnaea*, xxxviii. (1874) 250.

NORTH ISLAND: From the North Cape southwards to Taupo and Hawke's Bay, not uncommon on cliffs, bank-sides, &c. Sea-level to 2000 ft. October-January.

A handsome species, remarkable for the broad flat leaves. When out of flower it might easily be mistaken for an iridaceous plant. Mr. Colenso's *C. gahnioides* is absolutely undistinguishable from the type.

2. *C. complanatum*, Berggr. in *Minnesk. Fisiog. Sallsk. Lund.* (1877) 23, t. 6, f. 1-5.—Stems tall, rather stout, compressed and 2-edged, smooth, finely striate, 2-4 ft. high, $\frac{1}{4}$ in. diam. at the base. Leaves about the length of the stem, distichous and equitant at the base, narrow-ensiform, acuminate, flat or slightly convex, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, pale-green, smooth, striate; margins even, not scabrid. Panicle long and narrow, 6-12 in., much branched; branches fascicled, erect; bracts sheathing, with ciliate margins. Spikelets numerous, chestnut-brown, $\frac{1}{6}$ - $\frac{1}{2}$ in. long, ovate-oblong, 2-3-flowered, 1 or 2 of the flowers fertile. Glumes usually 5, ovate, acuminate,

striate; margins ciliate; 2 or 3 outer empty. Stamens 3. Style-branches 3. Nut almost sessile, ovoid, trigonous, puberulous, pale-chestnut, narrowed upwards into a rather stout pyramidal beak.

NORTH ISLAND: Auckland—Ohaeawai and Taheke, *Berggren*! Puhipuhi Forest, *Kirk*! Maungatapere, *Carse*! September–November.

Apparently a very local plant, not yet found outside the Bay of Islands and Whangarei Counties.

3. *C. articulatum*, *R. Br. Prodr.* 237.—Stems tall and stout, terete, transversely septate, 3–6 ft. high. Leaves long, almost equalling the stems, terete, the transverse septa usually very distinct; sheaths large and long, pale; tip subulate, acute, pungent. Panicle large, lax, terminal, much branched, drooping, 9–18 in. long; branches numerous, closely placed; bracts sheathing, the lowest with a terete septate lamina $\frac{1}{2}$ – $1\frac{1}{2}$ in. long. Spikelets excessively numerous, rich red-brown, $\frac{1}{8}$ in. long, 2–4-flowered, but usually only one flower is fertile. Glumes 4–7, ovate or ovate-lanceolate, acuminate, keeled, membranous, puberulous, the 2 outer empty. Stamens 3. Style-branches 3. Nut broadly obovoid, trigonous with the angles thick and corky, red-brown; beak short, umbonate.—*Hook. f. Fl. Nov. Zel.* i. 276; *Handb. N.Z. Fl.* 304; *Benth. Fl. Austral.* vii. 403. *Baumea loculata*, *Boeck. in Linnæa*, xxxviii. (1874) 243. *Gahnia articulata*, *F. Muell. Second Census Austral. Pl.* 216.

NORTH ISLAND: Margins of lakes and ponds from the North Cape to Taupo and Hawke's Bay, not uncommon. Sea-level to 1800 ft. November–January.

Also in Australia, New Caledonia, and the New Hebrides. Small states sometimes have the stems and leaves obscurely septate.

4. *C. glomeratum*, *R. Br. Prodr.* 237.—Stolons creeping, clothed with pale striated scales. Stems tufted, terete and rush-like, slender, rather soft, 1–3 ft. high. Leaves few from the base of the stem, long, terete, with acute subulate tips. Panicle contracted, 3–10 in. long; lower branches distant, usually long and narrow, erect; upper closer together, shorter and broader; primary bracts large and sheathing, almost spathaceous, reddish-brown. Spikelets numerous, fascicled, red-brown, $\frac{1}{8}$ – $\frac{1}{5}$ in. long, ovate-oblong, 2–3-flowered, 1 or rarely 2 of the flowers fertile. Glumes usually 5, ovate, acuminate, membranous, striated; margins ciliate; 2–3 outer ones empty. Stamens 3. Style-branches 3. Nut elliptic-oblong when mature, obtusely trigonous, smooth and polished, reddish or reddish-yellow; tip tumid, acute, pubescent.—*Hook. f. Fl. Nov. Zel.* i. 275; *Fl. Tasm.* ii. 94; *Handb. N.Z. Fl.* 304; *Benth. Fl. Austral.* vii. 404. *Schoenus rubiginosa*, *Forst. Prodr.* n. 493. *Fuirena rubiginosa*, *Spreng. Fl. Hal. Mant.* i. 29; *A. Cunn. Precur.* n. 271; *Raoul, Choix*, 40. *Baumea rubiginosa*, *Boeck. in Linnæa*, xxxviii. (1874) 241.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Swampy places, margins of lakes, &c., plentiful in the North Island, less common in the South Island. Sea-level to 2000 ft. November-January.

Best distinguished by the narrow interrupted panicle, broad spathaceous bracts, and 2-3-flowered spikelets. It extends to Australia and Tasmania, the Malay Archipelago, and northwards to China and Japan.

5. **C. Huttoni**, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 551.—Stems tufted, slender, terete, rather wiry, striate, 3-5 ft. high. Leaves few towards the base of the stem, long, terete, striate; tips subulate, acute. Panicle elongated, rather lax, drooping, 10-18 in. long; lower branches remote, solitary or fascicled, 3-6 in. long or more; bracts large and sheathing, membranous, acuminate. Spikelets numerous, fascicled, brown, $\frac{1}{8}$ - $\frac{1}{6}$ in. long, 2-5-flowered, rarely more than 2 of the flowers fertile. Glumes 4-7, ovate, acuminate, membranous, striated; margins ciliate. Stamens 3 or rarely 2. Style-branches 3. Nut small, oblong, obtusely trigonous, smooth when mature, pale; beak very small.

NORTH ISLAND: Auckland—Whangape, Waikare, Waihi, and other lakes in the Middle Waikato, *Kirk! T. F. C.*; Lake Tikitapu, *Kirk!* Lake Taupo, *Kirk!* Sea-level to 1600 ft. December-February.

Very close to *C. glomeratum*, but distinguished by the larger size, longer panicle with drooping branches, smaller many-flowered spikelets, and smaller paler nut.

6. **C. teretifolium**, *R. Br. Prodr.* 237.—Stems densely tufted, terete or slightly compressed, rush-like, firm, striate, 1-3 ft. high. Leaves few at the base of the stem, long, terete except towards the sharp subulate tip, which is often obscurely 3-4-angled; sheaths rather loose. Panicle oblong, 2-6 in. long, much branched, dense; lower branches closely placed, not distant as in *C. glomeratum*; bracts short. Spikelets very numerous, fascicled, dark-brown, $\frac{1}{6}$ in. long, 1- or rarely 2-flowered, but in the latter case the upper flower is sterile. Glumes ovate, acuminate or awned, membranous, ciliate or almost glabrous, the 2 or 3 outer empty. Stamens 3. Style-branches 3. Nut very small, oblong-orbicular, not trigonous, corky, conspicuously corrugated; beak very minute, smooth.—*Hook. f. Fl. Nov. Zel.* i. 276; *Handb. N.Z. Fl.* 304; *Benth. Fl. Austral.* vii. 406.

NORTH ISLAND: Abundant in swamps from the North Cape to Hawke's Bay and Taranaki. SOUTH ISLAND: Aorere Valley, *Kirk!* near Westport, *Townson!* Hokitika, *Kirk!* Canterbury, *Armstrong!* Southern Alps, *Sinclair* and *Haast* (Handbook). Sea-level to 2000 ft. November-January.

This has the habit and general appearance of *C. glomeratum*, but the stems and leaves are firmer, the panicle shorter and much more dense, bracts smaller, spikelets usually 1-flowered, and nut very different. It is also found in eastern Australia and Tasmania.

7. **C. Gunnii**, *Hook. f. Fl. Tasm.* ii. 95, t. 148B.—Stems densely tufted, rush-like, very slender, terete, rigid and wiry, 9 in. to 3 ft. high. Leaves sometimes wholly reduced to sheathing scales at the base of the stem, but usually 1 long terete stem-like leaf with 2–3 sheaths below it; tip subulate, pungent; sheaths long, purplish-red. Panicle elongate, narrow, interrupted, 6–18 in. long; branches remote, slender, erect, the lowest sometimes 6 in. long in large specimens, in small ones reduced to 1 in.; bracts closely sheathing, with a short erect lamina. Spikelets not fascicled, distinct, sessile, 1-flowered. Glumes usually 3, lanceolate, acuminate, the 2 lowest empty; the uppermost fertile, longer and narrower than the others, and spreading in fruit; margins involute. Stamens 3. Style-branches 3. Nut pedicelled, ovoid or oblong-ovoid, smooth and shining when mature. 3-ribbed when young, tip large and tumid, pale-yellow with dark base and tip.—*Handb. N.Z. Fl.* 304; *Benth. Fl. Austral.* vii. 407; *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 24, t. 6, f. 6–11. *C. laxiflorum*, *Hook. f. Fl. Tasm.* ii. 95, t. 148A. *Lampocarya tenax*, *Hook. f. Fl. Nov. Zel.* i. 277.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards, not uncommon. Sea-level to 2500 ft. December–February.

Also in eastern Australia and Tasmania. In fruit the margins of the upper part of the flowering glume become strongly involute, firmly enclosing the 3 persistent stamens, which remain attached to the pedicel of the ripe nut. The nut is thus frequently detained swinging from the spikelet long after it has separated from the point of attachment.

8. **C. junceum**, *R. Br. Prodr.* 237.—Rhizome stout, woody, creeping, clothed with pale-brown scales. Stems tufted, rigid, erect, terete, rush-like, 1–2 ft. high. Leaves reduced to 1 long and closely appressed sheath with a minute vertically flattened lamina, below which are 1 or 2 much shorter sheaths. Panicle short, spike-like, sparingly branched, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; bract at the base very small. Spikelets red-brown, $\frac{1}{8}$ in. long, 1–2-flowered, the lower flower alone fertile. Glumes 4–5, oblong-ovate, acute, membranous, keeled, puberulous, the 2 or 3 outer empty. Stamens 3. Style-branches 3. Nut oblong-ovoid, obscurely trigonous, dark-brown, surface rough; beak small, tumid, puberulous.—*Hook. f. Fl. Tasm.* ii. 95; *Handb. N.Z. Fl.* 305; *Benth. Fl. Austral.* vii. 408. *Lepidosperma striatum*, *Hook. f. Fl. Nov. Zel.* i. 279 (not of R. Br.). *L. Colensoi*, *Boeck. in Linnæa*, xxxviii. (1874) 328.

NORTH AND SOUTH ISLANDS: From the North Cape to the Bluff, not uncommon, especially in the North Island, often in brackish-water swamps. Sea-level to 2000 ft. November–January.

Also throughout the greater part of Australia and in New Caledonia.

9. **C. Vauthiera**, *C. B. Clarke, MS.*—Rhizome short, stout, creeping. Stems densely tufted, rather stout, conspicuously 4-

angled, smooth, wiry, rigid, 9–18 in. high. Leaves 1 or 2 like the stems, 2–10 in. long, sometimes reduced to sheathing scales. Panicle contracted into a dense oblong spike-like head $\frac{1}{3}$ – $\frac{1}{2}$ in. long, subtended by a rigid sheathing bract terminated by a subulate erect point. Spikelets few, densely compacted, $\frac{1}{6}$ in. long, 1-flowered. Glumes 5–6, ovate-lanceolate, acute or acuminate, coriaceous, puberulous, the terminal one subtending the flower, the remainder all empty. Hypogynous scales 6, small, white, triangular, connate into a 6-lobed cup. Stamens 3. Style-branches 3. Nut broadly oblong, obtusely trigonous, smooth, red-brown; beak short, ovoid-conic, pubescent.—*Vauthiera australis*, *A. Rich. Fl. Nouv. Zel.* 107, t. 20; *A. Cunn. Precur.* n. 276; *Raoul, Choix*, 40. *Lepidosperma australe*, *Hook. f. Fl. Nov. Zel.* i. 279. *L. tetragonum*, *Hook. f. Handb. N.Z. Fl.* 307 (not of *Labill.*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon throughout. Sea-level to 2000 ft. November–January.

This differs from *Lepidosperma*, to which it was referred by Hooker, in always wanting the sterile flower below the fruit-bearing one. I have followed Mr. Clarke's suggestion in placing it in *Cladium*, notwithstanding the presence of hypogynous bristles. It is endemic in New Zealand.

10. **C. capillaceum**, *C. B. Clarke, MS.*—Rhizome short, creeping. Stems densely tufted, very slender, filiform, wiry, terete, finely striate, 9–18 in. high. Leaves reduced to a single closely appressed purplish-red sheath, usually with a very minute erect scale-like lamina at the tip. Panicle terminal, very small, slender, $\frac{1}{5}$ – $\frac{3}{4}$ in. long, of from 3 to 7 spikelets. Spikelets narrow, obscurely distichous, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, 1-flowered. Glumes usually 5, ovate-lanceolate, awned, membranous, the 3 outer empty. Stamens 3. Style-branches 3. Nut oblong-ovoid, 3-ribbed, pale, smooth, crowned by the long and narrow pubescent style-base, which is as long as the nut itself.—*Chætospora capillacea*, *Hook. f. Fl. Tasm.* ii. 81, t. 141A (not of *Nees*). *C. capillaris*, *F. Muell. Fragm. Phyt. Austral.* ix. 34. *Elynanthus capillaceus*, *Benth. Fl. Austral.* vii. 377. *Schoenus capillaris*, *F. Muell. Second Census Austral. Pl.* 215. *S. tenuis*, *Kirk in Trans. N.Z. Inst.* i. ed. ii. (1871) 94.

NORTH ISLAND: From the North Cape southwards, not uncommon. SOUTH ISLAND: Near Westport, *Townson!* Sea-level to 2000 ft. December–February.

Also found in Victoria and Tasmania. The narrow elongated persistent style-base gives the nut a different appearance to that of any other New Zealand species.

10. **LEPIDOSPERMA**, *Labill.*

Perennial herbs. Stems stout, leafy at the base, often flat or compressed. Leaves similar to the stems, sheathing at the base. Inflorescence a terminal panicle, either long and much branched, or

short and spike-like. Spikelets numerous, 2-4-flowered, the uppermost flower perfect and fruit-bearing, the remainder sterile. Glumes 5-10, subdistichous, imbricate; outer 1-6 empty. Hypogynous bristles 6, short, ovate or lanceolate with a setiform tip. Stamens 3. Style-branches 3. Nut ovoid or oblong, obtusely trigonous; tip obtuse, indurated, smooth.

Species 36. One of them is endemic in South China and Malacca, the remaining 35 are confined to Australia, with the exception of two which are found in New Zealand as well.

Stems flat and thin. Panicle narrow, lax, 4-12 in. long .. 1. *L. laterale*.
Stems slender, terete. Spike simple, 1-3 in. long .. 2. *L. filiforme*.

1. ***L. laterale***, *R. Br. Prodr.* 234.—Stems densely tufted, flat or very slightly convex, with sharp almost cutting edges, smooth, firm, 2-4 ft. high, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad. Leaves 3-5, similar to the stems but shorter, equitant at the base. Panicle long and narrow, 4-12 in. long; branches not very closely placed, elongated, erect, simple or again branched, lowest bract with an erect lamina $1\frac{1}{2}$ -4 in. long, upper bracts short. Spikelets sessile, red-brown, $\frac{1}{5}$ in. long, usually with 1 perfect flower and 1 sterile one below it. Glumes ovate, acuminate or almost awned, keeled, minutely puberulous on the back, the 3 outer empty. Hypogynous bristles 6, connate at the base, small, short, tipped with delicate fragile setæ which are sometimes half as long as the nut. Stamens 3. Style-branches 3. Nut ovoid-oblong, obtusely trigonous, smooth when fully mature, tip tumid.—*Benth. Fl. Austral.* vii. 393. *L. concavum*, *Hook. f. Fl. Tasm.* ii. 91, t. 146B; *Handb. N.Z. Fl.* 307 (not of *R. Br.*). *L. longitudinalis*, *Hook. f. Fl. Nov. Zel.* i. 279 (not of *Labill.*).

NORTH ISLAND: Auckland—Clay hills from the North Cape to the Upper Waikato, not uncommon. Sea-level to 1500 ft. January-February.

Also in eastern Australia and Tasmania.

2. ***L. filiforme***, *Labill. Pl. Nov. Holl.* i. 17, t. 15.—Rhizome short, stout, woody, creeping. Stems numerous, densely tufted, slender but rigid, erect, terete, rush-like, 1-3 ft. high. Leaves reduced to a rather long and closely appressed sheath, terminating in a short and almost filiform erect lamina. Spike simple, terminal, 1-3 in. long; rachis slender, straight or scarcely flexuose; sheathing bracts narrow. Spikelets 1 to each bract, narrow-linear, terete or nearly so, $\frac{1}{5}$ in. long, 2-flowered, the upper flower perfect, the lower sterile. Glumes 4-5, narrow-lanceolate, acute, the 2 or 3 outer ones shorter and broader, empty. Stamens 3. Nut oblong, obtuse or minutely apiculate, obtusely trigonous with a thickened line down the angles. Hypogynous scales at the base of the nut minute, whitish, subulate-lanceolate, acute, closely appressed.—*Hook. f. Fl. Tasm.* ii. 93 (in part); *F. Muell. Fragm.* ix. 27; *Benth. Fl. Austral.* vii. 399.

NORTH ISLAND: Auckland—Clay hills between Mongonui and Kaitaia, H. Carse! August–September.

I am indebted to Mr. C. B. Clarke for identifying this with the Australian *L. filiforme*. So far, it has only been gathered in New Zealand by Mr. Carse, but it will probably prove to be not uncommon north of Auckland. In Australia it has been recorded from Victoria and Tasmania.

11. **GAHNIA**, Forst.

Tufted perennial herbs, usually of large size. Stems tall and stout, leafy throughout their length. Leaves usually long, very coarse and harsh, narrowed into long subulate or filiform points; margins involute, scabrid. Panicle large, terminal; sometimes broad and effuse, with drooping branches; sometimes narrower and more erect. Spikelets clustered, black or dark-brown, 1–2-flowered; the upper flower hermaphrodite and fruit-bearing; the lower flower sterile or male. Glumes many, imbricated all round; the outer 2–5 or more empty, keeled, often mucronate; flowering glumes minute at first, but enlarging in fruit. Hypogynous bristles wanting. Stamens usually 4 in the hermaphrodite flower, often 4–6 in the male flower; filaments greatly elongated after flowering, and often holding the nut. Nut hard and bony, ellipsoid or ovoid or obovoid, obscurely trigonous or terete, red or reddish-brown or black.

Species about 30, most of them natives of Australia and New Zealand, but extending through the Pacific islands to the Sandwich Islands and Malay Archipelago. Of the 8 found in New Zealand, one occurs in Lord Howe Island and another in the Sandwich Islands, the remaining 6 are endemic. The genus is remarkable for the extraordinary extent to which the filaments lengthen after flowering. In *G. procera* they are often quite 2 in. long, or from 8 to 10 times the length of the flowering glumes. They generally remain attached to the base of the nut after it has fallen away, and as the other end of the filament is usually entangled with the glumes or with the filaments of other flowers the nut remains swinging by the filaments quite free from the spikelet. Mr. Colenso (Trans. N.Z. Inst. xviii. 281) has suggested that some of these filaments are in reality hypogynous scales, giving as a reason for this belief that in his *G. scaberula* and *G. exigua* he has noticed within the same flower stamens with the filaments still very short, and filaments already lengthened to the full extent. He failed to notice that the lower male flower expands long before the hermaphrodite flower placed just above it, so that its filaments have lost their anthers and lengthened long before the expansion of the upper flower takes place. The two flowers are placed so close together that it is quite easy to take the two for one.

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| Tall, 3–7 ft. Panicle 1–3 ft., nodding. Glumes 7–8; 4–5 empty, unequal. Nut small, $\frac{1}{8}$ in., red-brown .. | 1. <i>G. setifolia</i> . |
| Smaller, 2–4 ft. Panicle $1\frac{1}{2}$ – $2\frac{1}{2}$ ft., rigid, erect. Glumes 6–7; 3–4 empty, subequal. Nut small, $\frac{1}{8}$ in., red-brown .. | 2. <i>G. rigida</i> . |
| Slender, 2–4 ft. Panicle $1\frac{1}{2}$ – $2\frac{1}{2}$ ft., narrow, elongate, branches distant. Glumes 8; 5 empty, unequal. Fruit large, $\frac{1}{2}$ – $\frac{3}{4}$ in., red-brown .. | 3. <i>G. pauciflora</i> . |
| Very tall and stout, 5–12 ft. Panicle 2–5 ft., nodding. Glumes 6–7; 4–5 empty, subequal. Nut large, $\frac{1}{2}$ – $\frac{3}{4}$ in., black when fully ripe .. | 4. <i>G. xanthocarpa</i> . |

Tall and stout, 5-7 ft. Panicle 2-3 ft., rigid, erect.

Glumes 8; 5 empty, subequal. Nut small, $\frac{1}{2}$ in., black 5. *G. robusta*.

Leafy, 2-4 ft. Panicle 1-1½ ft., narrow, lax. Glumes 4;

2 empty, very long. Nut large, $\frac{1}{2}$ in., red-brown 6. *G. procera*.

Slender, 2-4 ft. Panicle 9-18 in., slender, narrow but

dense. Glumes 4-5; 2-3 empty. Nut small, $\frac{1}{2}$ in., black 7. *G. lacera*.

Small, 6-14 in. Leaves exceeding the stem, spreading.

Glumes 6; 4 empty. Nut small, ovoid, apiculate, black 8. *G. Gaudichaudi*.

1. *G. setifolia*, Hook. f. *Fl. Nov. Zel.* i. 278.—Stems numerous, tall, stout, 3-7 ft. high, forming large tussocks. Leaves many, almost as long as the stems, involute, with scabrid cutting edges and long filiform points. Panicle large, nodding, 1-3 ft. long, much and laxly branched; branches long, erect in flower, drooping in fruit; bracts long and leafy, with scabrid filiform points. Spikelets very numerous, dark-brown or almost black, $\frac{1}{6}$ - $\frac{1}{5}$ in. long, 2-flowered; the lower flower male, the upper hermaphrodite and fruit-bearing. Glumes 7-8; the 4-5 outer ones empty, gradually increasing in length, keeled, acuminate, minutely scaberulous; the 3 upper very small at the time of flowering and concealed within the uppermost empty glume, enlarged in fruit and closely appressed to the nut, obtuse, convolute. Stamens usually 4 to each flower, but varying from 4 to 6; filaments greatly elongated in fruit. Style-branches 3, rarely 4. Nut small, $\frac{1}{6}$ in. long, elliptic-obovoid, narrowed at both ends, smooth and shining, indistinctly grooved, red-brown when fully ripe, transversely grooved within.—*Handb. N.Z. Fl.* 306. *G. scaberula*, *G. parviflora*, and *G. multiglumis*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 278-80. *Lampocarya setifolia*, *A. Rich. Fl. Nouv. Zel.* 111; *A. Cunn. Precur.* n. 282; *Raoul, Choix*, 40.

NORTH ISLAND: Abundant throughout. SOUTH ISLAND: Marlborough—
Picton, *J. Rutland*! Sea-level to 2000 ft. December-January.

2. *G. rigida*, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 551.—Stems densely tufted, harsh and rigid, erect, 2-4 ft. high. Leaves equalling the stems, with involute scabrid margins and very long drooping filiform points. Panicle stiff, erect, rather narrow, elongate, 1½-2½ ft. long; branches numerous, short, strict, erect; bracts with dark sheaths and long filiform points. Spikelets numerous, crowded, dark-brown or almost black, $\frac{1}{5}$ - $\frac{1}{4}$ in. long, 2-flowered; the lower flower male, the upper hermaphrodite and fruit-bearing. Glumes 6-7; the 3-4 outer empty, almost equal in length, keeled, narrowed into long acuminate points, scaberulous on the keel, margins paler, membranous; the 3 inner small at the time of flowering, enlarged in fruit, convolute, obtuse. Stamens 4-5 in each flower; filaments greatly elongated in fruit. Style-branches 3. Nut small, $\frac{1}{6}$ in. long, oblong-obovoid, smooth, brown, or brown mottled with red and black.—*G. exigua*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 279.

SOUTH ISLAND: Nelson—Dun Mountain, *T. F. C.*; Aorere Valley and Ngakawau, *Kirk*; Westport, *Townson*! Westland—Between Hokitika and Ross, Marsden, near Greymouth, *Kirk*! Sea-level to 2500 ft.

Distinguished from *G. setifolia* by the usually smaller size, erect rigid panicle, longer and more acuminate subequal glumes, and more obovoid nut. The erect compact panicle, subequal glumes, and small nut separate it from the following species.

3. *G. pauciflora*, *T. Kirk in Trans. N.Z. Inst.* i. ed. 2 (1871) 94. —Stems slender, sparingly leafy, 2–3 ft. high, rarely more. Leaves equalling the stems, narrow, with scabrid cutting edges and long filiform points. Panicle long, lax but narrow, $1\frac{1}{2}$ –3 ft. long; branches distant, slender; bracts long, leafy. Spikelets loosely scattered on the branches of the panicle, not crowded, sessile or shortly pedicelled, brownish-black, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, 2-flowered; lower flower male, upper hermaphrodite and fruit-bearing. Glumes usually 8; the 5 lower ones empty, gradually increasing in size, ovate, acute or acuminate; the 3 upper small at first, but enlarging in fruit, deeply concave, appressed to the nut, obtuse. Stamens 4–5 to each flower; filaments greatly elongated in fruit. Style-branches 3–4. Nut large, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, elliptic-ovoid, acute at both ends, smooth and shining, often grooved on the inner face, red-brown with a dark tip, transversely grooved within.—*G. Hectori*, *Kirk in Trans. N.Z. Inst.* ix. (1877) 551.

NORTH AND SOUTH ISLANDS: From the North Cape southwards to Marlborough, Nelson, and Westland, plentiful. Sea-level to 3000 ft. October–December.

A well-marked species, at once recognised by the slender elongated panicle, with lax distant branches; the numerous empty glumes, the lower of which are unusually small; and the large red-brown nut.

4. *G. xanthocarpa*, *Hook. f. Handb. N.Z. Fl.* 306. —Stems numerous, stout, often as thick as the finger, densely tufted, leafy, 5–12 ft. high, forming huge clumps in forests. Leaves numerous, very long, $\frac{1}{2}$ in. broad or more, involute, scabrid on the margins and veins, upper part produced into long filiform points. Panicle very large, 2–5 ft. long, drooping, excessively branched; branches long, slender, pendulous, 9–18 in. long or even more; bracts long, leafy. Spikelets innumerable, densely crowded, brown, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, 2-flowered; lower flower male, upper flower hermaphrodite and fruit-bearing. Glumes 6–7; the 3–4 outer empty, not very different in length, ovate, shortly acuminate; the 3 upper smaller, deeply concave, obtuse. Stamens usually 4 to each flower; filaments lengthening much in fruit. Style-branches 3–4. Nut large, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, elliptic-oblong or -obovoid, acute at both ends, smooth and shining, sometimes indistinctly grooved, black when fully ripe, yellowish when immature, transversely grooved within.—*Benth. Fl. Austral.* vii. 418. *G. ebenocarpa*, *Hook. f. ex Kirk in Trans.*

N.Z. Inst. i. (1869) 149. *Lampocarya xanthocarpa*, *Hook. f. Fl. Nov. Zel.* i. 278. *Cladium xanthocarpum*, *F. Muell. Fragm. Phyt. Austral.* ix. 13.

NORTH ISLAND: Not uncommon in forests throughout. SOUTH ISLAND: Marlborough—*J. Rutland*! Nelson—Motueka Valley, *T. F. C.*; Westport, *Townson*! Westland—*Hokitika, Kirk*! Canterbury—*Haast, Armstrong*. Sea-level to 2500 ft. February–March.

The finest species of the genus, at once identified by its large size, enormous panicles, and large black nut. Also recorded from Lord Howe Island.

5. *G. robusta*, *T. Kirk in Trans. N.Z. Inst.* xxvi. (1894) 261.—Stems robust, as thick as the little finger, 6–7 ft. high. Leaves almost as long as the stems, involute, with scabrid margins and long filiform points. Panicle large, 2–3 ft. long, dense, narrow, erect; branches 5–10 in. long, strict, erect; bracts leafy, with long filiform points. Spikelets crowded, dark-brown or almost black, 2-flowered; lower flower male, upper hermaphrodite and fruit-bearing. Glumes usually 7; the 4 outer empty, subequal, awned; the 3 inner small in the flowering stage, but enlarged in fruit, concave, coriaceous, obtuse. Stamens 4–6 in each flower, elongated in fruit. Style-branches 2–4. Nut small, $\frac{1}{6}$ – $\frac{1}{5}$ in. long, elliptic-obovoid, black when fully ripe, transversely grooved within.

NORTH ISLAND: Wellington—*Mungaroa, Kirk*! March.

My knowledge of this plant is confined to the specimens in Mr. Kirk's herbarium. These greatly resemble *G. rigida*, but the plant is said to be much larger, and the nut to be always black when fully ripe.

6. *G. procera*, *Forst. Char. Gen.* 52.—Stems stout, densely tufted, 2–4 ft. high. Leaves equalling or exceeding the stems, narrowed into long filiform points; margins involute, smooth below, scabrid above; sheaths dark-brown or almost black. Panicle slender, lax but narrow, elongate, 12–18 in. long; branches often remote, short, erect or slightly drooping in fruit; bracts leafy, with purplish-black sheaths. Spikelets scattered along the branches or clustered towards their tips, large, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, dark purplish-black, 2-flowered; lower flower male, upper hermaphrodite and fruit-bearing. Glumes 4; 2 outer empty, very large and exceeding the spikelet, elliptic-lanceolate, mucronate, striate; 2 inner shorter, oblong-lanceolate, obtuse. Stamens usually 4 to each flower; filaments elongating greatly in fruit. Style-branches 4. Nut large, $\frac{1}{4}$ in. long, narrow-elliptic, smooth and shining, obscurely grooved, reddish-brown or reddish-yellow when ripe, transversely grooved within.—*A. Rich. Fl. Nouv. Zel.* 112; *A. Cunn. Precur.* n. 284; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 278; *Handb. N.Z. Fl.* 306.

SOUTH ISLAND: Nelson—Buller Valley, *T. F. C.*; Mount Rochfort and vicinity of Westport, *Townson*! Westland—Hokitika, *Kirk*! Kelly's Hill, *Cockayne*! Otago—Dusky Sound, *Forster*; Port Preservation, *Lyall*; Clinton Valley, *Petrie*. STEWART ISLAND: Port Pegasus, *Petrie*! *Pearson*! Sea-level to 2500 ft. December–February.

A very distinct species, remarkable for the large purplish-black spikelets and long empty glumes, which are only 2 in number. There is an unnamed specimen, presumably from the North Island, in Mr. Colenso's herbarium.

7. *G. lacera*, *Steud. Cyp.* 164.—Stems rather slender, leafy, densely tufted, 2–4 ft. high. Leaves equalling or exceeding the stems, flat or involute, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, narrowed into long filiform points, margins scabrid. Panicle elongated, narrow but rather dense, 9–18 in. long; branches short, erect or inclined; bracts long and leafy. Spikelets alternate on the branches of the panicle, shortly pedicelled, brown, 1-flowered. Glumes 4–5; 2 or 3 outer empty, subequal, ovate or ovate-lanceolate, acuminate or awned, rather membranous, minutely scaberulous on the back; 2 inner shorter, concave, obtuse, margins scarious and lacerate. Stamens 4; filaments greatly elongate in fruit. Style-branches 3. Nut small, $\frac{1}{6}$ in. long, oblong-obovoid, obtuse, shining, black, very obscurely transversely striate within.—*Hook. f. Handb. N.Z. Fl.* 306. *Lampocarya lacera*, *A. Rich. Fl. Nouv. Zel.* 109; *A. Cunn. Precur. n.* 281; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel. i.* 277.

NORTH ISLAND: From the North Cape to Cook Strait, not uncommon. Sea-level to 2000 ft. July–August.

This is quoted from the South Island in the Handbook, but I have seen no specimens from thence.

8. *G. Gaudichaudii*, *Steud. Cyp.* 164.—Stems short, densely tufted, obtusely trigonous, leafy, 6–18 in. high. Leaves very numerous, spreading, much exceeding the stems, narrow, rigid, scabrid, sheaths short, submembranous. Panicle narrow, contracted, rigid, leafy, 3–9 in. long; branches few, short, erect; bracts very long and leafy. Spikelets clustered on the branches, elliptic-lanceolate, turgid, acute, chestnut-brown, 1-flowered. Glumes 6, firm and coriaceous, minutely puberulous, ciliolate on the margins; 4 outer small, gradually increasing in size, ovate-lanceolate, acuminate, awned; 2 inner much longer, rigid in fruit, acuminate. Stamens usually 3; filaments scarcely lengthening after flowering. Style-branches 3. Nut small, ovoid, obscurely trigonous, minutely apiculate, smooth, black, not transversely grooved within.—*Hillebr. Fl. Hawaii*, 481. *G. affinis*, *Steud. Cyp.* 164. *G. arenaria*, *Hook. f. Handb. N.Z. Fl.* 306. *Lampocarya affinis*, *Brong. in Duperr. Voy. Coq. Bot.* 166, t. 29; *Hook. f. Fl. Nov. Zel. i.* 277. *Morelotia gahniæformis*, *Gaud. in Freyc. Voy. Bot.* 416, t. 28; *A. Rich. Fl. Nouv. Zel.* 115; *A. Cunn. Precur. n.* 285; *Raoul, Choix*, 40.

NORTH AND SOUTH ISLANDS: Dry hills from the North Cape to Banks Peninsula, but not common to the south of Cook Strait. Sea-level to 2000 ft.

Also in the Sandwich Islands.

12. *OREOBOLUS*, R. Br.

Dwarf perennial herbs, forming dense cushion-shaped masses in alpine bogs. Stems branched, very closely compacted, leafy throughout. Leaves numerous, close-set, distichous and equitant, more rarely irregularly imbricate all round. Peduncle axillary, short at first but lengthening after the flowers expand, strict, compressed, bearing a terminal spikelet with or without 1 or 2 lateral ones. Spikelets minute, narrow, 1-flowered; flower hermaphrodite. Glumes 3 or rarely 4, the outer the largest, the second and third subequal, the fourth when present small, not much longer than the nut. Hypogynous scales (perianth-segments) 6, in 2 series, subequal, narrow, rigid, erect. Stamens 3. Style slender, continuous with the ovary; branches 3. Nut obovoid, obtuse with a depressed star-like mark at the apex, smooth.

In addition to the 2 species described below, one of which extends to Victoria and Tasmania, there is also one in Andine and antarctic America, and another in the Sandwich Islands.

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|---|--|
| Leaves obscurely distichous. Peduncle shorter than the leaves; spikelets usually 2, rarely 1 or 3 | 1. <i>O. pumilio</i> . |
| Leaves conspicuously distichous. Peduncle often equaling or exceeding the leaves in fruit; spikelets usually 1 .. | 1A. <i>O. pumilio</i> var. <i>pectinatus</i> . |
| Leaves obscurely distichous, very narrow, strict. Peduncle shorter than the leaves; spikelets usually 1 | 2. <i>O. strictus</i> . |

1. *O. pumilio*, R. Br. *Prodr.* 236.—Stems much branched, short, $\frac{1}{2}$ –2 in. high, forming broad and dense cushion-shaped masses. Leaves obscurely distichous, $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, erect or incurved, rarely spreading, narrow-linear, narrowed towards the obtuse tip, concave or almost flat in front, veinless or indistinctly 3-nerved; margins minutely serrulate; sheaths equitant, membranous, 3-nerved. Peduncles stout, rigid, mostly shorter than the leaves; spikelets usually 2, rarely 3 or 1. Glumes 3–4; the outer one the largest, leaf-like, 3-nerved; the second and third about equal; the fourth, when present, minute, not much exceeding the nut. Hypogynous scales narrow-lanceolate, acute, serrulate. Stamens 3. Style-branches 3. Nut small, obovoid, obtuse, whitish or brownish.—*Hook. f. Handb. N.Z. Fl.* 308; *Fl. Tasm.* ii. 94; *Benth. Fl. Austral.* vii. 346.

SOUTH ISLAND: Nelson—Mount Rochfort and other mountains near Westport, *Townson*! Westland—Arthur's Pass, *T. F. C.*; Kelly's Hill, *Petrie*! Worsley's Pass, *Cockayne*! Otago—Mountains above Lake Harris, *Kirk*! 2000–4000 ft.

Var. **pectinatus**, *C. B. Clarke, MS.*—Larger and softer, sometimes forming tufts 3–5 ft. high and a foot or more in diam. Leaves conspicuously distichous, often almost flabellately arranged, with broad equitant 5–7-nerved membranous sheathing bases; lamina linear-subulate, rigid, channelled in front. Peduncles 1-flowered, often equalling or exceeding the leaves in fruit.—*O. pectinatus*, *Hook. f. Fl. Antarct. i. 87, t. 49; Fl. Nov. Zel. i. 275.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: From the summit of Moehau (Cape Colville) and Taupo southwards, abundant in mountainous districts. Altitudinal range usually from 2000 to 4500 ft., but descending to sea-level in Stewart Island and the Auckland and Campbell Islands.

I have followed Mr. C. B. Clarke's views in the arrangement of the two forms of *O. pumilio* described above. The typical variety is also found on the mountains of Victoria and Tasmania; var. *pectinatus* is endemic.

2. **O. strictus**, *Berggr. in Minneskr. Fisiog. Sällsk. Lund. (1877) 25, t. 6, f. 12–24.*—Stems 2–3 in. high, creeping and rooting at the base, laxly tufted, much branched; branches not nearly so dense as in *O. pumilio*, erect, curved, leafy throughout their length. Leaves obscurely distichous, 1–2½ in. long, strict and erect or second, very narrow-linear, deeply canaliculate above, obtuse, margins minutely serrulate; sheaths broad, membranous, 3–5-nerved, rounded or truncate at the tip. Peduncle much shorter than the leaves; spikelets 1, rarely 2, narrow. Glumes 3; outer the largest, minutely serrulate; the two others subequal, narrow, erect. Hypogynous scales 6, narrow-lanceolate, acute, minutely serrulate. Stamens 3. Style-branches 3, long, filiform. Nut small, obovoid, narrowed at the base, obtuse, white.—*O. serrulatus*, *Col. in Trans. N.Z. Inst. xxii. (1890) 492.*

NORTH ISLAND: Rangipo Plain, near Ruapehu, *H. Hill.* SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.*; Lake Rotoiti, *Kirk!* Canterbury—Arthur's Pass, *Berggren! Kirk! T. F. C.* Otago—Inch-Clutha, Swampy Hill, Maungatua, Mount Kyeburn, Hector Mountains, Blue Mountains, Bluff, *Petrie!* STEWART ISLAND: *Kirk!* Usually between 2000 and 4000 ft., but descends to sea-level in Otago and Stewart Island.

Very close to *O. pumilio*, but a much more laxly tufted plant, with narrower strict leaves, which considerably overtop the peduncle.

13. UNCINIA, Pers.

Perennial herbs, usually tufted and grass-like, with fibrous roots. Culms erect, terete or obscurely trigonous, striate, leafy at the base. Leaves very narrow-linear, flat or involute, often keeled, margins usually scabrid. Spikelets unisexual, arranged in a simple linear or oblong spike; male terminal; females placed lower down. Glumes imbricated all round the axis, ovate or oblong or lanceolate, obtuse or acute or the lower ones awned, concave, 1–3-nerved. Male flowers with 3 stamens; filaments filiform in all the New Zealand species, flat and dilated in some

others. Female flowers with the ovary included in a flask-shaped organ called the utricle or perigynium; style long, protruding; branches 3, filiform. Rhachilla produced beyond the mouth of the utricle into a long bristle hooked at the tip. Nut trigonous or subcompressed, enclosed in the persistent more or less enlarged utricle.

A genus of about 30 species, found in Australia and Tasmania, New Zealand, and America from Mexico and the West Indies to Fuegia. Of the 12 species native in New Zealand, 4 extend to Australia and Tasmania, and 1 to South America, the remaining 7 are endemic. The genus only differs from *Carex* in the rhachilla being exerted beyond the utricle in the shape of a hooked bristle. The New Zealand species are highly variable and most difficult of discrimination. *U. purpurata*, *cæspitosa*, *riparia*, *rupestris*, and *filiformis* present an almost unbroken series of forms, and I doubt if any two observers would arrive at the same conclusions respecting them, even if they worked on the same material.

Section A. Spike short and broad, $\frac{1}{2}$ -1 in. long, oblong or linear-oblong, dense-flowered.

- | | |
|--|---------------------------|
| Culms 2-9 in., rather stout. Leaves shorter than the culms, $\frac{1}{2}$ - $\frac{1}{10}$ in. diam. Spike pale, $\frac{1}{2}$ -1 in. Utricle scabrid | 1. <i>U. Sinclairii</i> . |
| Culms 2-6 in., weak. Leaves longer than the culms, filiform, $\frac{1}{10}$ - $\frac{1}{20}$ in. diam. Spike pale, $\frac{1}{3}$ - $\frac{1}{2}$ in. Utricle very small, lanceolate | 2. <i>U. tenella</i> . |
| Culms 4-9 in., slender, strict. Leaves shorter than the culms, filiform, $\frac{1}{10}$ - $\frac{1}{30}$ in. diam. Spike brownish, $\frac{1}{3}$ - $\frac{2}{3}$ in. Utricles conspicuously nerved | 3. <i>U. nervosa</i> . |
| Culms 3-12 in., stout. Leaves flat, grassy, $\frac{1}{12}$ - $\frac{1}{8}$ in. diam. Spike brown or chestnut-brown, $\frac{1}{2}$ -1 in. long. Utricles faintly nerved | 4. <i>U. compacta</i> . |

Section B. Spike elongated, 1-6 in. long, linear or narrow linear-oblong, dense-flowered, continuous.

- | | |
|--|--------------------------|
| Culms 6-14 in., stout or slender. Leaves flat, grassy; sheaths dusky-brown. Spike brownish, 1-2 in. Glumes oblong-obovate, usually obtuse | 5. <i>U. purpurata</i> . |
| Culms 6-14 in., slender. Leaves flat, grassy, $\frac{1}{15}$ - $\frac{1}{6}$ in. diam. Spike pale or green, $1\frac{1}{2}$ -3 in. Glumes oblong-lanceolate, acute or acuminate | 6. <i>U. cæspitosa</i> . |
| Culms 9-20 in., slender. Leaves flat, grassy, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad. Spike 3-6 in., linear-elongate. Glumes oblong-lanceolate, brownish | 7. <i>U. australis</i> . |

Section C. Spike $\frac{1}{2}$ -4 in. long, linear, very slender, lax-flowered, usually interrupted towards the base.

- | | |
|---|-----------------------------|
| Culms 12-24 in., slender. Leaves flat, $\frac{1}{12}$ - $\frac{1}{10}$ in. diam. Spike $1\frac{1}{2}$ -5 in. Utricles distinctly scabrid above | 8. <i>U. leptostachya</i> . |
| Culms 9-20 in., slender. Leaves flat or slightly involute, $\frac{1}{30}$ - $\frac{1}{10}$ in. diam. Spike $1\frac{1}{2}$ -4 in., green. Glumes always shorter than the utricles, in var. <i>Banksii</i> barely half their length | 9. <i>U. riparia</i> . |
| Everywhere red-brown. Culms 6-14 in., strict, rigid. Leaves usually shorter than the culms, flat or involute, $\frac{1}{15}$ - $\frac{1}{10}$ in. Spike 1-2 in., rigid. Glumes nearly as long as the utricles | 10. <i>U. rubra</i> . |

- Culms 3-12 in., slender. Leaves usually shorter than the culms, flat, $\frac{1}{2}$ – $\frac{1}{5}$ in. diam. Spike $\frac{1}{2}$ – $1\frac{1}{2}$ in. Glumes brown or chestnut, almost as long as the utricles .. 11. *U. rupestris*.
 Culms 3-9 in., very slender. Leaves usually longer than the culms, filiform, convolute, $\frac{1}{50}$ – $\frac{1}{30}$ in. diam. Spike $\frac{1}{2}$ – $1\frac{1}{2}$ in., extremely slender. Glumes pale, about equal to the utricles 12. *U. filiformis*.

1. *U. Sinclairii*, Boott ex Hook. f. *Handb. N.Z. Fl.* 309.—Rhizome stoloniferous. Culms 2-9 in. high, rather stout, smooth, subrigid, erect or curved, obtusely trigonous, leafy towards the base. Leaves shorter than the culms or equalling them, flat, grassy, $\frac{1}{12}$ – $\frac{1}{10}$ in. broad; margins scabrid. Spike rather stout, dense, narrow-oblong, $\frac{1}{2}$ –1 in. long; male portion very short, narrow; bract wanting. Glumes ovate, obtuse or the lowest subacute, pale whitish-green with broad scarious margins, many-nerved on the back. Utricles equalling the glumes or rather longer than them, ovate-lanceolate, narrowed at both ends, triquetrous, nerved, scabrid towards the tip, margins ciliate; bristle yellowish, twice the length of the utricule. Nut elliptic-oblong, trigonous.—*C. B. Clarke in Journ. Linn. Soc.* xx. 394; *Kukenthal in Bot. Centralbl.* 82 (1900) 3.

Var. *elegans*, *Kukenthal, MS.*—Culms more slender. Leaves numerous, $\frac{1}{20}$ – $\frac{1}{15}$ in. broad, exceeding the culms. Spike elongate, $\frac{3}{4}$ – $1\frac{1}{4}$ in. long, linear. Glumes cinnamon-brown.

SOUTH ISLAND: Nelson—Lake Tennyson, *Travers*. Canterbury—Broken River, *Enys*! Otago—Eweburn, Naseby, Hector Mountains, Mount Cardrona, Upper Hawea, *Petrie*! Dart Valley, *Kirk*! Var. *elegans*: Black's, Otago, *Petrie*! 1200-4000 ft. December-February.

A distinct plant, easily recognised by the small size, broad flat leaves, stout and pale spike, and scabrid utricles. It has recently been found in Fuegia.

2. *U. tenella*, *R. Br. Prodr.* 241.—Rhizome very slender, creeping. Culms densely tufted, weak, flaccid, 4-9 in. high, rarely more. Leaves numerous, usually overtopping the culms, flat, grassy, filiform, $\frac{1}{30}$ – $\frac{1}{20}$ in. broad. Spike oblong, short, dense, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, $\frac{1}{8}$ in. broad; male portion very short, inconspicuous, sometimes reduced to 1 or 2 flowers; female flowers 6-10; lowest glume produced into a setaceous bract usually far exceeding the spike. Glumes lanceolate, acuminate; keel greenish, 1-nerved; margins pale, thin and membranous. Stamens usually 2. Utricles slightly longer than the glumes, oblong-lanceolate, narrowed at both ends, glabrous, faintly nerved; bristle nearly twice the length of the utricule.—*Hook. f. Fl. Tasm.* ii. 102, t. 152; *Benth. Fl. Austral.* vii. 433; *C. B. Clarke in Journ. Linn. Soc.* xx. 391.

SOUTH ISLAND: Otago—Routeburn, *Kirk*! Clinton Valley, *Petrie*!

I have followed *Kukenthal* in referring this to the Australian *U. tenella*, of which it has the slender flaccid habit. But it differs in the larger utricles, which

are nearly twice the size, and in this respect approaches *U. nervosa*. Some specimens collected by Petrie at Kelly's Hill, Westland, with shorter and more wiry leaves, and a rather longer spike are almost intermediate between the present plant and *U. nervosa*.

3. *U. nervosa*, *Boott ex Hook. f. Fl. Tasm.* ii. 102, t. 153A.— Culms densely tufted, slender, strict and wiry, 4–9 in. high, leafy at the base only. Leaves shorter than the culms, strict, erect, wiry, filiform, $\frac{1}{40}$ – $\frac{1}{30}$ in. diam.; margins involute. Spike much more slender than in *U. compacta*, and not so dense, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, about $\frac{1}{8}$ in. diam.; lowest glume sometimes produced into a filiform bract. Glumes ovate-lanceolate; subacute, pale-brown, keel distinctly 3-nerved or plicate; margins thin and membranous, almost scarious. Utricles equalling or slightly exceeding the glumes, oblong-lanceolate, narrowed at both ends, trigonous, glabrous, distinctly nerved; bristle about twice the length of the utricule. Nut trigonous.—*U. compacta* var. *nervosa*, *C. B. Clarke in Journ. Linn. Soc.* xx. 395. *U. Cheesemaniana*, *Boeck. in Engl. Bot. Jahr.* v. (1884) 521.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.* Otago—Maungatua, *Petrie!* 2000–5000 ft.

Very close to *U. compacta*, to which it is referred by Mr. Clarke, but differing in the more slender habit, strict filiform leaves, narrower spike, more membranous distinctly 3-nerved glumes, and usually longer many-nerved utricles. The Maungatua specimens are still more slender, and may be distinct.

4. *U. compacta*, *R. Br. Prodr.* 241. — Rhizome creeping, stoloniferous. Culms rather stout, rigid, obscurely trigonous, leafy towards the base, variable in size, in dry open or alpine situations often dwarfed to 2 in. or even less, in moist sheltered or shaded localities attaining 8–12 in. Leaves usually shorter than the stems but sometimes equalling or even exceeding them, subrigid, flat, grassy, striate, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad; margins scabrid. Spike short, stout, dense, oblong, $\frac{1}{2}$ –1 in. long by about $\frac{1}{4}$ in. diam., pale greenish-brown to chestnut-brown; the lowest glume sometimes produced into a leaf-like bract occasionally exceeding the spike. Glumes ovate-lanceolate, acute or subacute; keel greenish, 1–3-nerved; margins pale-brown, membranous. Stamens 3. Utricles about equalling the glumes, oblong-lanceolate, narrowed at both ends, trigonous, glabrous, smooth or faintly nerved, spreading when fully ripe; bristle stout, about twice the length of the utricule. Nut trigonous.—*Hook. f. Handb. N.Z. Fl.* 309; *Fl. Tasm.* ii. 102, t. 153B; *Benth. Fl. Austral.* vii. 434; *C. B. Clarke in Journ. Linn. Soc.* xx. 394. *U. divaricata*, *Boott ex Hook. f. Fl. Nov. Zel.* i. 286. *U. Clarkii*, *Petrie in Trans. N.Z. Inst.* xx. (1887) 185.

Var. *Petriei*, *C. B. Clarke, MS.*—Less rigid. Spike longer and not so dense, 1–2 in. long; bract usually overtopping the spike. Utricles smaller, more evidently stipitate. Otherwise as in the type.

NORTH ISLAND: Mount Hikurangi, *Adams* and *Petrie*! Ruahine Range, *Colenso*, *Petrie*! Tararua Range, *Buchanan*! SOUTH ISLAND: Abundant in mountain districts throughout. 1000-5500 ft. December-February.

A very variable plant. New Zealand specimens as a rule have rather paler and more acute glumes than is the case in the Australian *U. compacta*, constituting the *U. divaricata* of Boott. But I can see no other difference, and many specimens are absolutely identical. Var. *Petriei* is connected with the type by numerous intermediates, between which it is impossible to draw a strict line of demarcation.

5. *U. purpurata*, *Petrie in Trans. N.Z. Inst.* xvii. (1885) 272.—Culms tufted, slender or rather stout, scabrid above, leafy at the base, 6-14 in. high. Leaves usually shorter than the stems but sometimes equalling or even exceeding them, flat or slightly concave, grassy, striate, $\frac{1}{10}$ - $\frac{1}{8}$ in. broad; margins scabrid; sheaths at the base dusky-brown. Spike $\frac{3}{4}$ -2 in. long, linear-oblong, usually dense, continuous. Male portion short, cylindric; bract absent, or present and exceeding the spike. Glumes oblong or obovate, obtuse or subacute, dark-brown with pale scarious margins, shorter than the utricule. Utricle lanceolate, tapering at both ends, plano-convex, quite glabrous, faintly nerved, about $\frac{1}{4}$ in. long; bristle nearly twice as long as the utricule.

Var. *fusco-vaginata*.—Leaves broader, $\frac{1}{13}$ - $\frac{1}{8}$ in. diam., equalling or overtopping the stems. Spike strict, linear, 1-1 $\frac{1}{2}$ in. long; bract usually wanting. Glumes green or brown.—*U. fusco-vaginata*, *Kukenthal in litt.*

SOUTH ISLAND: Otago—Not uncommon in mountain districts, *Petrie*! *Kirk*! Var. *fusco-vaginata*: Mount Arthur Plateau, *T. F. C.*; Mount Fyffe, *Kirk*! Arthur's Pass, *Cockayne*! *T. F. C.*; Craigieburn Mountains, *Cockayne*! Mount Cardrona, Hector Mountains, Mount Ida, *Petrie*! 1000-4000 ft. December-January.

This appears to be intermediate between *U. compacta* and *U. cæspitosa*. The var. *fusco-vaginata* may be identical with *U. compacta* var. *viridis*, *C. B. Clarke* in *Journ. Linn. Soc.* xx. 395, of which I have seen no authenticated examples.

6. *U. cæspitosa*, *Boott in Hook. f. Fl. Nov. Zel.* i. 287.—Culms tufted, slender, leafy, 6-14 in. high. Leaves longer or shorter than the culms, flat, grassy, very variable in width, from $\frac{1}{15}$ - $\frac{1}{8}$ in. broad; margins scabrid. Spike 1 $\frac{1}{2}$ -3 in. long, narrow-oblong or almost linear, rather dense or lax but not interrupted; male portion very short; bract variable, broad and foliaceous or narrow and setaceous. Glumes lanceolate or oblong-lanceolate, acute or acuminate, membranous, green or pale-green, usually equalling the utricule. Utricles about $\frac{1}{4}$ in. long, oblong-lanceolate, suddenly narrowed above, smooth or faintly nerved; bristle about twice the length of the utricule.—*Hook. f. Handb. N.Z. Fl.* 310; *C. B. Clarke in Journ. Linn. Soc.* xx. 393. *U. horizontalis*, *Col. in Trans. N.Z. Inst.* xv. (1883) 334.

Var. *minor*, *Kukenthal*, MS.—Smaller and more slender. Leaves narrower. Spike shorter, much more slender.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In hilly or mountainous localities from Hokianga southwards, not uncommon. Sea-level to 4000 ft. November–January.

An exceedingly variable plant, forms of which are not separated by any strict line of demarcation from *U. purpurata*, *U. riparia*, *U. rupestris*, and *U. filiformis*. Its chief characters are the rather broad flat leaves, not very lax narrow-oblong spike, pale-green glumes which are usually as long as the utricles or nearly so, and rather large oblong-lanceolate acuminate utricles, averaging $\frac{1}{2}$ in. long.

7. *U. australis*, *Pers. Syn.* ii. 534.—Culms densely tufted, tall, slender, smooth, 9–20 in. high, leafy at the base. Leaves long, usually considerably overtopping the culms, flat, striate, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad; margins scabrid. Spike linear-elongate, 3–6 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, dense except sometimes at the base, cylindrical; male portion narrower, variable in length, occupying $\frac{1}{3}$ – $\frac{1}{6}$ of the spike; bract long, leafy, usually exceeding the spike. Glumes oblong-lanceolate, acute, 1-nerved, at first pale-green, but brown or chestnut in fruit, upper about equalling the utricle, lower sometimes exceeding it. Stamens 3. Utricle elliptic-oblong, narrowed at both ends, sometimes almost fusiform, triquetrous, faintly nerved; bristle stout, nearly twice the length of the utricle.—*A. Cunn. Precur.* n. 286; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 287; *Handb. N.Z. Fl.* 309; *C. B. Clarke in Journ. Linn. Soc.* xx. 393. *U. compacta*, *A. Rich. Fl. Now. Zel.* 118 (not of *R. Br.*). *U. Lindleyana*, *Kunth, Enum.* ii. 526. *U. scaberrima*, *Nees in Linnæa*, ix. (1834) 305. *U. rigidula*, *Steud. Cyp.* 245. *U. alopecurioides*, *Col. in Trans. N.Z. Inst.* xv. (1883) 335. *U. bracteata*, *Col. l.c.* xvi. (1884) 341. *U. polyneura*, *Col. l.c.* xix. (1887) 270.

Var. *clavata*, *Kukenthal*, MS.—Spike clavate, often $\frac{1}{2}$ in. broad at the top of the female portion; glumes densely crowded. Other characters as in the type.

Var. *ferruginea*, *C. B. Clarke*, MS.—Agreeing with the type in size and habit, but glumes longer and narrower, sometimes twice the length of the utricle, lanceolate or subulate-lanceolate, chestnut-brown with a green usually 3-nerved keel. Utricles with a longer beak.—*U. ferruginea*, *Boott in Hook. f. Fl. Nov. Zel.* i. 288, t. 64B; *Handb. N.Z. Fl.* 309; *C. B. Clarke in Journ. Linn. Soc.* xx. 394. *U. nigra*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 253. *U. variegata*, *Col. l.c.* xx. (1888) 211.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS.—The typical form abundant throughout; var. *ferruginea* not uncommon from Te Aroha southwards. Var. *clavata*: Near Wellington, *Kirk!* Otira Gorge, *Kirk!* *T. F. C.*; Mount Cook district, *T. F. C.* Sea-level to 3000 ft. November–February.

Easily recognised by the large size and very long cylindrical dense-flowered spike. I have followed Clarke and Kukenthal in uniting Boott's var. *ferruginea* with it, there being no differences of importance beyond the very variable one

of the length of the glumes. I cannot distinguish the species described by Mr. Colenso even as varieties. *U. australis* is said to occur in the Sandwich Islands.

8. *U. leptostachya*, Raoul, *Choix Pl. Nouv. Zel.* 12, t. 5B.—Rhizome short. Culms densely tufted, slender, trigonous and scabrid above, leafy at the base, 1–2 ft. high; sheaths brown or purplish-red at the base. Leaves usually much longer than the culms, slender, flat, $\frac{1}{12}$ – $\frac{1}{10}$ in. broad; margins scabrid. Spike $1\frac{1}{2}$ –5 in. long, very slender, lax-flowered; male portion short, almost filiform; bract setaceous or filiform, longer or shorter than the spike, sometimes wanting. Glumes laxly placed, often distant in the lower part of the spike, oblong-lanceolate, acute or obtuse, from half as long to as long as the utricule, green or purplish-red, 1-nerved on the back, membranous. Utricule narrow-lanceolate or almost fusiform, trigonous, distinctly scabrid above, faintly nerved; bristle twice as long as the utricule.—*Hook. f. Fl. Nov. Zel.* i. 286; *Handb. N.Z. Fl.* 309; *C. B. Clarke in Journ. Linn. Soc.* xx. 389. *U. scabra*, Boott in *Hook. f. Fl. Nov. Zel.* i. 285. *U. distans*, Boott, *l.c.* 286. *U. disticha*, Col. in *Trans. N.Z. Inst.* xx. (1888) 210.

NORTH AND SOUTH ISLANDS, STEWART ISLAND.—From Mongonui southwards, not uncommon. Sea-level to 3000 ft. November–January.

The distinctly scabrid utricles at once separate this from all its allies. Its habit is that of coarse states of *U. riparia*.

9. *U. riparia*, R. Br. *Prodr.* 241.—Culms densely tufted, slender, leafy, trigonous, scabrid above, 9–20 in. high. Leaves equalling or exceeding the culms, flat or slightly involute, $\frac{1}{20}$ – $\frac{1}{10}$ in. broad; margins scabrid. Spike $1\frac{1}{2}$ –4 in. long, linear, lax, often interrupted below, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad; male portion variable in length; bract usually wanting but sometimes present and exceeding the spike. Glumes lanceolate or oblong-lanceolate, acute or obtuse, pale, membranous, 1-nerved on the back, shorter than the utricule. Utricule lanceolate, acuminate, narrowed at the base, quite glabrous, faintly nerved, about $\frac{1}{4}$ in. long; bristle twice as long as the utricule.—*Hook. f. Fl. Tasm.* ii. 102, t. 152B; *Benth. Fl. Austral.* vii. 434; *C. B. Clarke in Journ. Linn. Soc.* xx. 392. *U. laxiflora*, Petrie in *Trans. N.Z. Inst.* xvii. (1885) 271. (?) *U. obtusata*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 341.

Var. *Banksii*, C. B. Clarke in *Journ. Linn. Soc.* xx. 392.—Leaves narrower, almost filiform, $\frac{1}{30}$ – $\frac{1}{20}$ in. broad. Glumes very short, often not more than half the length of the utricule. *U. Banksii*, Boott in *Hook. f. Fl. Nov. Zel.* i. 287; *Handb. N.Z. Fl.* 310. *U. capillaris*, Col. in *Trans. N.Z. Inst.* xx. (1888) 210.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: The typical form in hilly districts from Pirongia Mountain and Taranaki southwards, most plentiful towards the south of the South Island. Var. *Banksii*: Abundant in the North Island, especially northwards of the East Cape, less common in the South Island, but extending as far as Foveaux Strait. Sea-level to 3000 ft. November–January.

The best characters of this variable species are the tall leafy habit, narrow flat leaves, long and linear very lax spike, and pale glumes always shorter than the utricles. The typical state occurs in Victoria and Tasmania; var. *Banksii* is endemic.

10. *U. rubra*, Boott in Hook. f. Fl. Nov. Zel. i. 287.—Whole plant red, red-purple, or brownish-red, usually forming a continuous sward. Culms 6–14 in. high, stout or slender, strict, rigid, leafy at the base, trigonous and scabrid above. Leaves much shorter than the culms, rarely equalling or exceeding them, flat or slightly involute, rigid or submembranous, striate, $\frac{1}{20}$ – $\frac{1}{15}$ in. broad; margins scabrid. Spike 1–2 in. long, rigid, linear, lax, continuous or slightly interrupted towards the base; male portion short; bract wanting. Glumes oblong-lanceolate, acute or obtuse, rigid, red or red-brown, slightly exceeding the utricles, obscurely 1-nerved on the back. Utricle lanceolate, tapering at both ends, glabrous, faintly nerved, about $\frac{1}{5}$ in. long; bristle nearly twice as long as the utricles.—Hook. f. Handb. N.Z. Fl. 310; C. B. Clarke in Journ. Linn. Soc. xx. 390.

Var. *rigida*.—Very densely tufted, forming tussocks similar to those of a *Juncus*. Culms and leaves rigid, strict, erect, wiry, deeply grooved, the leaves deeply concave or involute. Spike $1\frac{1}{2}$ –3 in. long; bract leafy, usually exceeding the spike.—U. *rigida*, Petrie in Trans. N.Z. Inst. xvii. (1884) 271 (not of Boeck.).

NORTH ISLAND: Plains near Lake Taupo, summit of Titikura, Colenso!
SOUTH ISLAND: Not uncommon in mountain districts. 500–4500 ft. December–February.

This is referred to *U. riparia* as var. *rubra* by Kükenthal, an opinion with which I cannot concur. It appears to me to be quite as distinct as most of the New Zealand species.

11. *U. rupestris*, Raoul, Choix Pl. Nouv. Zel. 13, t. 5A.—Culms densely tufted, slender, leafy at the base, 3–12 in. high. Leaves usually longer than the culms, flat or slightly involute, $\frac{1}{25}$ – $\frac{1}{15}$ in. broad; margins scabrid. Spike $\frac{1}{2}$ –2 in. long, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, linear, lax, continuous or slightly interrupted below; male portion usually $\frac{1}{3}$ the length of the spike; bract often wanting, but sometimes present and exceeding the spike. Glumes lanceolate, acute, membranous, greenish-brown or chestnut, 1-nerved on the back, slightly shorter than the utricles; margins narrow, hyaline or scarious. Utricle lanceolate, attenuate above, quite glabrous, faintly nerved, about $\frac{1}{5}$ in. long; bristle about twice as long as the utricles.—Boott in Hook. f. Fl. Nov. Zel. i. 286; Hook. f. Handb. N.Z. Fl. 310; C. B. Clarke in Journ. Linn. Soc. xx. 392. *U. Hookeri*, Boott in Hook. f. Fl. Antarct. i. 91, t. 51.

NORTH ISLAND: Ruahine Mountains, Colenso! sources of the Tukituki River, inland Patea, Petrie! Tararua Mountains, H. H. Travers! SOUTH ISLAND: Nelson—Mount Arthur Plateau, T. F. C. Westland—Okarito, A. Hamilton! Otago—Not uncommon, Petrie! Kirk! STEWART ISLAND: Kirk! Petrie! P. Goyen! AUCKLAND AND CAMPBELL ISLANDS: Hooker, Kirk! Sea-level to 3500 ft. December–January.

Much too closely allied to *U. riparia*, from which it can only be separated by the smaller size, usually shorter spike, and by the glumes being often tinged with chestnut-brown or purplish-red, whereas they are usually green in the forms of *U. riparia*. From *U. filiformis* it is removed by the stouter habit, broader flat leaves, and rather stouter spike.

12. *U. filiformis*, Boott in Hook. f. *Fl. Nov. Zel.* i. 286.—Culms densely tufted, extremely slender, filiform, 3–9 in. high, leafy towards the base. Leaves usually much exceeding the culms, very slender, filiform, $\frac{1}{50}$ – $\frac{1}{30}$ in. broad; margins involute, scabrid. Spike $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, extremely slender, linear, lax, $\frac{1}{15}$ – $\frac{1}{10}$ in. broad; bract filiform, exceeding the spike. Glumes oblong-lanceolate, acute or acuminate, membranous, pale, equalling the utricles or nearly so. Utricles $\frac{1}{8}$ – $\frac{1}{6}$ in. long, lanceolate, acuminate, smooth and glabrous, faintly nerved; bristle twice as long as the utricule.—Hook. f. *Handb. N.Z. Fl.* 310; C. B. Clarke in *Journ. Linn. Soc.* xx. 391. *U. debilior*, F. Muell. *Fragm. Phyt. Austral.* viii. 151; Benth. *Fl. Austral.* vii. 435.

NORTH ISLAND: Auckland—Pirongia Mountain, T. F. C. Hawke's Bay—Ruahine Mountains, Colenso! H. Hill! Petrie! Taranaki—Mount Egmont, Petrie! Wellington—Tararua Mountains, H. H. Travers! T. P. Arnold! SOUTH ISLAND, STEWART ISLAND: In hilly and mountain districts throughout, but not common. 1000–4500 ft. December–January.

In its usual state this can be recognised without much difficulty by its small size and very slender habit, filiform convolute leaves, small slender spikes, and small narrow utricles, which only slightly exceed the glumes. But large forms are indistinguishable from states of *U. riparia*, *U. cæspitosa*, and others. Mr. C. B. Clarke refers to it the *U. debilior*, F. Muell., from Lord Howe Island.

14. CAREX, Linn.

Perennial herbs. Culms erect, more or less trigonous or rarely terete, often scabrid on the angles. Leaves mostly radical, grass-like, usually scabrid on the margins and keel. Spikelets unisexual or bisexual, rarely diœcious, solitary or more commonly arranged in clusters or spikes, racemes or panicles, all androgynous or the upper male with rarely a few female flowers at the top or base, the lower female often with a few male flowers at the base or top. Glumes imbricate all round the axis. Male flowers of 3 stamens, without perianth or hypogynous bristles. Female flowers consisting of a compressed or trigonous ovary, included in a flask-shaped or urceolate 2-toothed organ called the utricule or perigynium; style-branches 2 or 3, long, filiform, protruding beyond the utricule. Nut lenticular or plano-convex or trigonous, enclosed in the persistent more or less enlarged utricule.

An immense genus of probably over 1200 species, of worldwide distribution, but most abundant in temperate regions, rare in the tropics, save on high mountains. Of the 53 species found in New Zealand, no less than 37 are endemic, the remaining 16 being mostly widely spread. In elaborating the New Zealand species for this work I have received great assistance from the two chief authorities on the genus—Mr. C. B. Clarke, F.R.S., of Kew, and Pastor Georg Kukenthal, of Grub, near Coburg. My warmest thanks are due to both.

Section I. *Spikelet solitary, simple, terminal.*

Leaves flat, grassy. Spikelet oblong, many-flowered.

Bract short or wanting 1. *C. pyrenaica*.

Leaves terete, strict and wiry. Spikelet ovoid, few-flowered. Bract long 2. *C. acicularis*.

Section II. *Spikelets several or many, androgynous or rarely dioecious, sessile, arranged in a compact or more or less interrupted spike, less often in a dense or rarely lax panicle. Styles 2.*

* Male flowers at the top of the spikelets.

Small, $\frac{1}{2}$ -2 in. Spikelets 2-4, compacted into an ovoid head $\frac{1}{4}$ - $\frac{1}{2}$ in. long. Utricles elliptic-ovoid, conspicuously winged 3. *C. pterocarpa*.

Slender, 2-12 in. Leaves almost filiform. Spikelets 3-8, in a dense or lax spike $\frac{1}{4}$ -1 in. long. Utricles ovate-lanceolate, beaked, nerved, minutely papillose 4. *C. Kirkii*.

Usually stout, 6-14 in. Leaves flat, grassy. Spikelets 4-10 in a dense spike $\frac{1}{2}$ -1 in. long. Utricles ovoid, beaked, strongly nerved, minutely papillose 5. *C. trachycarpa*.

Slender, strict, wiry, 6-18 in. Spikelets 6-10 in a linear spike $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long. Utricles narrow-lanceolate, nerved, winged above, tapering into a long subulate beak 6. *C. Muelleri*.

Slender 1-3 ft. Spikelets many, in a lax panicle, 4-9 in. long, sometimes reduced to a spike 3-5 in. Utricles narrow-lanceolate, tapering into a long subulate beak 7. *C. kaloides*.

Slender, laxly tufted, 1-2 ft. Spikelets many, in a dense or interrupted oblong spike $\frac{3}{4}$ -1 $\frac{1}{4}$ in. long. Utricles ovoid, swollen at the base, shining, ribbed on the back, contracted into a rather long beak 8. *C. teretiuscula*.

Stout, harsh, 1-3 ft. Culms acutely triquetrous. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in. broad. Spikelets many, in a stout spike-like panicle 3-7 in. long. Utricles ovoid, conspicuously nerved 9. *C. appressa*.

Slender, harsh, 1-3 ft. Leaves $\frac{1}{8}$ - $\frac{1}{4}$ in. broad. Spikelets many, in a linear spike-like panicle 6-18 in. long. Utricles ovoid, conspicuously nerved 10. *C. virgata*.

Slender, drooping, 2-4 ft. Spikelets very numerous in a much and laxly branched nodding panicle 1-2 $\frac{1}{2}$ ft. long. Utricles broadly ovoid, smooth or indistinctly nerved .. 11. *C. secta*.

** Male flowers at the base of the spikelets.

Slender, 4-18 in. Leaves flat, grassy. Spikelets 2-5, pale-green, compacted into a short head or spike. Utricles ovoid, nerved, narrowed into a long beak 12. *C. inversa*.

Small, depressed, $\frac{1}{2}$ -3 in. Leaves involute, wiry. Spikelets 2-3 or solitary. Utricles ovoid at the base; beak very long 13. *C. resectans*.

Slender, 3-14 in. Leaves involute, wiry. Spikelets 2-4, brown, compacted into a short head. Utricles broadly ovoid, smooth, nerveless, not beaked 14. *C. Colensoi*.

Slender, 4-18 in. Leaves flat, grassy. Spikelets 3-5, green, approximate or a little remote. Utricles spreading, narrow-ovoid, spongy at the base, nerved, beaked .. 15. *C. echinata*.

Short, 2-8 in. Leaves flat, grassy. Spikelets 2-4, red-brown, in a dense spike $\frac{1}{2}$ in. long. Utricles elliptic-ovoid, not winged, faintly nerved; beak short .. 16. *C. lagopina*.

Stout or slender, 6-18 in. Leaves flat, grassy. Spikelets 4-6, brownish-green, compacted into a lobed spike $\frac{3}{4}$ -1 in. long. Utricles elliptic-ovoid, winged, narrowed into a long beak 17. *C. leporina*.

Section III. Spikelets distinct, usually stalked, unisexual; the male spikelets constantly uppermost, rarely mixed with female flowers; the lower spikelets all female or with a few male flowers at the base or apex.

* Styles 2. Nut lenticular or biconvex, not trigonous.

† Female spikelets with the male flowers (when present) at the top of the spikelet, very rarely below. Utricles much compressed, conspicuously nerved; beak very short, with an entire or very minutely 2-toothed mouth.

Culms 3-14 in. Spikelets 3-5, $\frac{1}{4}$ - $\frac{3}{4}$ in. long, sessile or the lowest very shortly stalked. Glumes obtuse. Utricles minutely granular-papillose 18. *C. Gaudichaudiana*.

Culms 1-2 ft. Spikelets 4-8, 1-3 in. long, the lower ones stalked. Glumes mucronate or even aristate 19. *C. subdola*.

Culms tall, stout or slender, 1-4 ft. Basal leaf-sheaths transversely fibrillose. Spikelets 8-24, 1-4 in. long, geminate or ternate or quinate, long-stalked and pendulous. Glumes aristate 20. *C. ternaria*.

Culms slender, 6-18 in. Basal leaf-sheaths not transversely fibrillose. Spikelets 4-6, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, solitary or the upper geminate. Glumes scarcely mucronate. Utricle not granular-papillose 21. *C. Sinclairii*.

†† Female spikelets with the male flowers (when present) at the base of the spikelet, very rarely at the top. Utricle plano-convex or unequally biconvex, beak obviously 2-toothed.

a. Terminal spikelet always mixed with female flowers.

Culms laxly tufted, 9-18 in. Leaves broad, $\frac{1}{8}$ - $\frac{1}{4}$ in. Spikelets 4-8, stout. Utricles elliptic, sharply serrate above .. 22. *C. Raouliei*.

b. Terminal spikelet very rarely mixed with female flowers.

Culms slender, 1-2 ft. Spikelets 4-7, $\frac{1}{2}$ -1 in. long. Glumes orbicular-ovate, obtuse. Utricles densely packed, spreading when ripe, unequally biconvex; margins smooth .. 23. *C. dipsacea*.

Culms filiform, 6-18 in., often elongating and prostrate in fruit. Spikelets 3-5, $\frac{3}{4}$ -1 in. long, approximate. Utricles plano-convex or nearly so, obscurely nerved; margins serrate above 24. *C. testacea*.

Culms rather stout, 4-8 in., much overtopped by the leaves. Spikelets 3-6, closely approximate, $\frac{1}{2}$ -1 in. long. Utricles elliptic-ovoid, strongly nerved, unequally biconvex; margins usually smooth 25. *C. Wakatipu*.

Culms laxly tufted, 6-18 in. Leaves short. Spikelets 2-4, male very stout, clavate. Utricles elliptic-ovoid, unequally biconvex, strongly nerved, purplish-black .. 26. *C. devia*.

Culms very slender, 6-18 in., often elongating in fruit. Leaves long, flat, keeled. Spikelets 4-8, $\frac{1}{2}$ -2 in. long, narrow; male slender. Utricles narrow-elliptic, turgid, obscurely nerved; margins smooth 27. *C. lucida*.

- Culms reddish, densely tufted, 1-2 ft. Leaves strict, semiterete. Spikelets 4-6, $\frac{1}{2}$ - $1\frac{1}{2}$ in. long. Glumes pale. Utricles elliptic, plano-convex; margins serrate .. 28. *C. Buchanani*.
- Culms very short, 1-4 in. Spikelets 4-5, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, approximate, almost concealed by the leaves. Utricles narrow elliptic-ovoid, plano-convex, narrowed into a long acutely bidentate beak .. 29. *C. cirrhosa*.
- Culms very short, 1-4 in. Spikelets 4-5, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, closely approximate. Utricles elliptic-ovoid, turgid, unequally biconvex; beak very short .. 30. *C. rubicunda*.

* Styles 3. Nut trigonous. (Styles often 2 in *C. Berggreni*.)

† Utricles glabrous (or the margins serrate above), hardly spreading when ripe.

a. *Small species.* Culms 1-5 in. high, overtopped by the leaves. Spikelets 2-4, closely approximate, often concealed by the leaves.

- Reddish. Culms very short, $\frac{1}{2}$ - $1\frac{1}{2}$ in. Leaves 1-2 in. $\times \frac{1}{15}$ - $\frac{1}{12}$ in., linear, flat, obtuse. Utricles elliptic, biconvex or obscurely trigonous; margins smooth; beak short. Styles often 2 .. 31. *C. Berggreni*.
- Green. Culms 1-3 in. Leaves $\frac{1}{2}$ in. broad, acute. Utricles narrow-ovoid, trigonous; margins serrate; beak rather long .. 32. *C. Hectori*.
- Glaucous-green. Culms 1-3 in. Leaves 2-6 in. $\times \frac{1}{25}$ - $\frac{1}{15}$ in. Utricles broadly ovoid, plano-convex; margins serrate; beak short .. 33. *C. decurtata*.
- Brownish-red or green. Culms 1-5 in. Leaves much longer, 3-10 in. $\times \frac{1}{10}$ - $\frac{1}{15}$ in.; tips often curled and twisted. Utricles elliptic-oblong, trigonous; margins smooth; beak very short .. 34. *C. uncinifolia*.

b. *Slender; culms 6-16 in. high. Leaves narrow, $\frac{1}{30}$ - $\frac{1}{12}$ in. broad, plano-convex or nearly so. Male spikelets solitary.*

- Culms 4-10 in. Leaves usually shorter, narrow. Spikelets 3-5, distant. Utricles narrow-ovoid, trigonous; margins smooth; beak short .. 35. *C. Dallii*.
- Culms 5-15 in. Leaves with broad sheathing bases, tips curled and twisted. Glumes pale. Utricles narrow-ovoid, unequally biconvex; margins smooth; beak short .. 36. *C. Petriei*.
- Culms 6-18 in., filiform. Leaves shorter or longer than the culms. Utricles elliptic-lanceolate, plano-convex; margins sharply serrate; beak long .. 37. *C. comans*.
- Culms 4-9 in. Leaves much longer, 12-20 in. Spikelets 5-6, closely approximate, pale. Utricles elliptic-ovoid, unequally biconvex; margins smooth; beak rather long .. 38. *C. plesiostrachys*.
- Culms 9-24 in. Spikelets 3-5, short, broad. Utricles broadly ovoid, turgid, biconvex; margins smooth; beak short .. 39. *C. litorosa*.

c. *Tall, stout or slender; culms 1-3 ft. high or more. Leaves flat or keeled, $\frac{1}{3}$ - $\frac{1}{2}$ in. broad. Male spikelets usually more than one (except in *C. dissita*).*

- Culms stout or slender, 1-2 $\frac{1}{2}$ ft. Leaves $\frac{1}{4}$ - $\frac{1}{3}$ in. broad. Spikelets 4-8, distant, on short peduncles, the lower rarely compound. Male spikelet solitary .. 40. *C. dissita*.

- Culms slender, 2-3 ft., often elongating in fruit. Leaves $\frac{1}{10}$ - $\frac{1}{8}$ in., keeled. Spikelets 5-10, distant; terminal 2-4 male; female slender, pendulous on long filiform peduncles, lower often compound 41. *C. Solandri*.
- Culms stout. Leaves broad. Spikelets 8; terminal 2-3 male; females erect on short peduncles, not compound 42. *C. ventosa*.
- Culms stout, 2-3 ft. Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in. broad. Spikelets 5-7; 2 terminal male; female short and stout, $\frac{1}{2}$ in. diam., the lowest remote. Utricles ovoid 43. *C. longiculmis*.
- Culms very tall and robust, 2-4 ft. Leaves $\frac{1}{2}$ - $\frac{1}{2}$ in. broad. Spikelets 6-12, 2-5 in. long, very stout; terminal 2-4 male. Utricles stipitate, obovoid-oblong 44. *C. trifida*.
- †† Utricles pubescent, hardly spreading when ripe; beak short. Nut with a swollen style-base.
- Culms 1-4 in. high, overtopped by the leaves. Spikelets 2-5, small, green, closely approximate 45. *C. breviculmis*.
- ††† Utricles glabrous, spreading when ripe; beak short.
- Rhizome long, creeping. Culms 4-8 in. Leaves much longer, glaucous. Spikelets 3-6. Utricles large, $\frac{1}{2}$ in. long, ovoid, turgid, corky, smooth 46. *C. pumila*.
- Rhizome tufted. Culms 6-16 in., slender. Leaves shorter. Spikelets 3-4, small. Utricles $\frac{1}{2}$ in. long, broadly oblong, turgid, strongly nerved, dark-brown 47. *C. Brownii*.
- †††† Utricles glabrous, spreading when ripe (except in *C. vacillans*), strongly costate-nerved, narrowed into a long and slender acutely 2-toothed beak (beak shorter and obscurely toothed in *C. Cockayneana*).
- Yellowish-green. Culms 2-8 in. Spikelets 3-8, small, stout, approximate. Utricles suddenly narrowed into a long beak 48. *C. flava*.
- Culms slender, 1-2 ft. Leaves harsh. Spikelets 4-9, distant, very slender, about $\frac{1}{2}$ in. broad. Utricles fusiform, hardly spreading 49. *C. vacillans*.
- Culms rather slender, 1-2 ft. Leaves harsh. Spikelets 5-8, distant, $\frac{1}{2}$ - $\frac{1}{2}$ in. broad; terminal one often mixed with female flowers. Utricles elliptic-lanceolate; beak short, obscurely 2-toothed 50. *C. Cockayneana*.
- Culms stout or slender, 1-3 ft. Leaves harsh. Spikelets 5-9, distant or the upper approximate; terminal one always largely mixed with female flowers. Utricles elliptic-lanceolate; beak long 51. *C. semi-Forsteri*.
- Culms stout, $1\frac{1}{2}$ -3 ft. Leaves harsh. Spikelets 5-9, distant; terminal 1-3 wholly male. Utricles elliptic-oblong; beak long 52. *C. Forsteri*.
- Culms stout or slender, 1-3 ft. Leaves soft, grassy. Spikelets 3-5, approximate or the lowermost remote; terminal one male. Utricles ovate-lanceolate, stipitate; beak long, linear, with 2 almost pungent teeth 53. *C. pseudo-cyperus*.

C. Haastiana, Boeckel. in Flora (1878), 168, collected by Haast in the South Island, and *C. Krullii*, Boeckel. l.c. (1882) 59, gathered by Krull in the Chatham Islands, are unknown to me. I have also failed to identify *C. quadrangulata*, Col. in Trans. N.Z. Inst. xvii. (1885) 254. *C. divisa*, Huds.; *C. muricata*, L. (but not of Cheesem. in Trans. N.Z. Inst. xvi. 411); *C. flacca*, Schreb. (*C. glauca*, Scop.); and *C. longifolia*, R. Br., are certainly not indigenous, and will be found in the list of naturalised species given at the end of this work.

1. *C. pyrenaica*, *Wahl. in Vet. Akad. Nya Handl. Stockh.* (1803) 139.—Culms slender, densely tufted, leafy at the base, 2–9 in. high, rarely more. Leaves numerous, longer or shorter than the culms, flat, grassy, $\frac{1}{2}\frac{1}{5}$ – $\frac{1}{1}\frac{1}{5}$ in. broad, grooved beneath; margins scabrid. Spikelet solitary, terminal, dark chestnut-brown, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, oblong or elliptic-oblong, densely many-flowered; male flowers at the top; bract wanting or very short. Glumes membranous, deciduous; of the female flowers ovate or ovate-oblong, acute or obtuse, shorter than the utricle; of the males narrower, linear-oblong, subacute. Utricle stipitate, lanceolate or almost fusiform, gradually narrowed into an obliquely bifid beak, unequally biconvex or almost plano-convex, smooth, spreading or reflexed when ripe. Styles usually 2 in New Zealand examples, usually 3 in European or American. Nut oblong, lenticular.—*Hook. f. Fl. Nov. Zel.* i. 280; *Handb. N.Z. Fl.* 312; *Boott, Ill. Car.* iv. 148, t. 475, 476; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 424.

NORTH ISLAND: Ruahine Mountains, *Colenso!* *E. W. Andrews!* SOUTH ISLAND: Nelson—Mount Arthur, Mount Peel, Raglan Mountains, *T. F. C.* Canterbury—Mountains above Arthur's Pass, Mount Dobson Range, Mount Cook district, *T. F. C.* Westland—Kelly's Hill, *Petrie!* Otago—Mountains of the Lake district, *Buchanan!* common on the higher mountains of the central and western districts, *Petrie!* 3500–6500 ft. December–March.

Also in Europe, Japan, and western North America from Alaska to Utah.

2. *C. acicularis*, *Boott in Hook. f. Fl. Nov. Zel.* i. 280, t. 63c.—Culms slender, strict, wiry, terete, densely tufted, leafy at the base, 1–6 in. high. Leaves shorter than the culms or equalling them, narrow, strict, rigid, straight or curved, almost terete, grooved down the front, obtuse and slightly scabrid at the tip. Spikelet small, solitary, terminal, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, broadly ovoid, red-brown, few-flowered; females 2–8; males 2–4 at the top of the spikelet. Glumes lanceolate or ovate-lanceolate, acute or the lower ones awned, keel green or pale-brown. Utricle shortly stipitate, lanceolate, narrowed above into a rather long beak, obtusely triquetrous; beak serrate, obliquely bifid at the tip. Styles 3, seldom 2. Nut pale, trigonous.—*Boott Ill. Car.* iv. 157, t. 508, f. 2; *Hook. f. Handb. N.Z. Fl.* 312; *Benth, Fl. Austral.* vii. 437; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 424. *C. Archeri*, *Boott in Hook. f. Fl. Tasm.* ii. 98, t. 150; *Ill. Car.* iv. 156, t. 508, f. 3. *C. inconspicua*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 612.

NORTH ISLAND: Mount Hikurangi, *Adams and Petrie!* Tongariro, *Herb. Colenso!* Ruahine Mountains, *Colenso!* *Olsen!* *E. W. Andrews!* SOUTH ISLAND: Not uncommon on the mountains of Nelson, Canterbury, and Westland. Otago—Mountains above Lake Harris, *Kirk!* Old Man Range, *Petrie!* 2500–5000 ft. December–March.

Easily distinguished from *C. pyrenaica* by the strict nearly terete leaves, smaller few-flowered spikelet, and erect subulate bract. It is also found in Victoria and Tasmania.

3. **C. pterocarpa**, *Petrie in Trans. N.Z. Inst.* xxxi. (1899) 353.—A dwarf species, forming depressed patches 3–5 in. diam. Rhizome stout, creeping, clothed with dark-brown scales. Culms very short, stout, densely tufted, $\frac{1}{2}$ –1 in. long, rarely more. Leaves sheathing the culms to the top and much exceeding them, $\frac{1}{2}$ –2 in. long, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad, tapering upwards to an acute point, somewhat rigid and coriaceous, flat or involute, deeply grooved; margins scabrid above. Spikelets 2–4, compacted into a broadly ovoid head $\frac{1}{4}$ – $\frac{1}{2}$ in. long, androgynous, pale brownish-green, $\frac{1}{8}$ – $\frac{1}{5}$ in. long; lowest bract usually with a foliaceous tip. Glumes ovate, acute, membranous, with a pale-green centre and brown margins. Male flowers at the top of the spikelets, female flowers below. Utricle elliptic-ovoid, plano-convex, conspicuously winged, strongly nerved, narrowed upwards into a bifid beak; margins and beak serrulate. Styles 2. Nut broadly oblong, lenticular.—*C. Thomsoni*, *Petrie in Trans. N.Z. Inst.* xviii. (1886) 298 (*not of Boott*).

SOUTH ISLAND: Otago—Hector Mountains, Mount Pisa, Old Man Range, *Petrie!* 4500–6500 ft.

A very distinct little plant.

4. **C. Kirkii**, *Petrie in Trans. N.Z. Inst.* xviii. (1886) 297.—Rhizome stout, woody, creeping. Culms short, densely tufted, slender, smooth, leafy throughout, $\frac{1}{2}$ –3 in. high. Leaves sheathing the whole or greater part of the culm and much longer than it, 2–6 in. long, pale-green, involute, filiform, usually strict and wiry. Spikelets 3–5, compacted into a dense oblong spike $\frac{1}{4}$ – $\frac{1}{2}$ in. long, sessile, androgynous, pale-green, few-flowered, $\frac{1}{5}$ – $\frac{1}{4}$ in. long; bract usually foliaceous. Glumes ovate-lanceolate, acute or acuminate, membranous, with a green midrib and pale margins. Male flowers 2–3 at the top of the spikelets, sometimes absent in the lower ones; female flowers 3–5 at the base. Utricle ovate-lanceolate, plano-convex, narrowed into a rather long bifid beak, strongly nerved, coriaceous, minutely papillose all over; margins and beak very finely crenulate. Styles 2. Nut broadly oblong, lenticular.

Var. **membranacea**, *Kukenthal, MS.*—Taller. Leaves 6–10 in. long, sheathing nearly the whole of the culm and twice as long as it. Spikelets 5–6, forming a loose spike $\frac{3}{4}$ –1 in. long. Utricle more membranous, narrower, with a longer and more tapering beak.

Var. **elatior**, *Kukenthal, MS.*—Still taller, the culms 6–12 in. long, the upper half not sheathed by the leaves. Leaves 9–18 in. long, broader, sometime $\frac{1}{15}$ in., flat or involute at the base. Spikelets 4–8 in a lax spike $\frac{3}{4}$ –1½ in. long, the lowest sometimes remote. Utricle as in var. *membranacea*, but more coriaceous.

SOUTH ISLAND: The typical form apparently not uncommon in mountain districts from the Clarence Valley to the south of Otago. Var. *membranacea*: Mount Arthur Plateau, *T. F. C.* Var. *elatior*: Mount Arthur Plateau, *T. F. C.*; Mount St. Bathans (Otago), *Petrie!* 2500–4500 ft. December–March.

An exceedingly variable plant. Depauperated states, with few-flowered spikelets, are easily mistaken for *C. resectans*, although the position of the male flowers at once separates the two plants. Var. *elatii* approaches *C. trachycarpa*, but is smaller and more slender, with narrower leaves, the inflorescence is much more lax, and the utricles are smaller and narrower.

5. *C. trachycarpa*, *Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 413.—Culms densely tufted, stout or rather slender, trigonous, scabrid above, 6–14 in. high. Leaves longer or shorter than the culms, flat, grassy, striate, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad; margins slightly scabrid above. Spikelets 4–10, compacted into an oblong or linear-oblong spike $\frac{1}{2}$ –1 in. long, androgynous, brown or pale-brown, ovoid, $\frac{1}{5}$ – $\frac{1}{3}$ in. long; lowest bract leafy, shorter or longer than the spike. Glumes ovate, acuminate or awned, pale-chestnut or pale-brown, with pale-green midribs and hyaline margins. Male flowers at the top of the spikelets, usually few. Utricle ovoid, plano-convex, narrowed into a short bifid beak, strongly nerved, minutely papillose all over; margins finely crenulate above. Styles 2. Nut oblong, lenticular.—*C. muricata*, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 411, 427 (not of Linn.).

SOUTH ISLAND: Nelson—Mount Arthur, Mount Peel, Mount Owen, T. F. C.; Mount Mantell, Townson! 3000–4500 ft. December–March.

In my revision of the New Zealand species I erroneously referred this to *C. muricata*, from which it differs altogether in the much smaller differently shaped utricles, which do not spread when ripe, and are minutely papillose on both surfaces. Its nearest ally is *C. Kirkii* var. *elatii*.

6. *C. Muelleri*, *Petrie in Trans. N.Z. Inst.* xviii. (1886) 298.—Pale whitish-green. Rhizome stout, woody, creeping. Culms densely tufted, slender, strict and wiry, terete below, compressed or plano-convex above, grooved, perfectly smooth, 6–24 in. high. Leaves shorter than the culms, narrow, $\frac{1}{3}$ – $\frac{1}{5}$ in. broad, strict and wiry, concave in front, convex on the back, grooved; margins smooth or slightly scabrid above. Inflorescence nearly diœcious or altogether so; spikelets 6–10, collected into a linear terminal spike $\frac{1}{2}$ –1½ in. long, sessile, few-flowered, about $\frac{1}{4}$ in. long; those of the male plant with an occasional female flower or altogether unisexual, those of the female sometimes with a staminate flower at the top of the spikelets; bracts short. Glumes lanceolate, acuminate or awned, thin and membranous, pale whitish-green. Utricle narrow-lanceolate, plano-convex, nerved, winged above and tapering into a very long bidentate beak, both surfaces minutely papillose above; margins ciliate-serrate. Styles 2. Nut linear-oblong, smooth, lenticular.—*C. viridis*, *Petrie in Trans. N.Z. Inst.* xiii. (1881) 332; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 428 (not of Schlecht. and Cham.).

SOUTH ISLAND: Nelson—Clarence Valley, T. F. C.; valley of the Stanley, Kirk! Canterbury—Mackenzie Plains, Lakes Tekapo and Pukaki, T. F. C. Otago—Rough Ridge, Clarke's Diggings, Carrick Range, Nevis Valley, Mount Cardrona, *Petrie!* 2000–4000 ft. December–February.

Easily distinguished by the strict whitish-green culms and leaves, almost dioecious inflorescence, and long and narrow utricles. It and *C. kaloides* are close allies of the North American and north Asiatic *C. siccata*, Dewey.

7. *C. kaloides*, Petrie in *Trans. N.Z. Inst.* xiii. (1881) 332.—Pale-green, forming tussocks very similar to those of *Poa australis*. Culms densely tufted, slender, drooping at the tips, obtusely trigonous, grooved, smooth, leafy towards the base, 1–3 ft. high. Leaves shorter than the culms, $\frac{1}{2}$ – $\frac{1}{3}$ in. broad, flat or involute, grassy, deeply grooved; margins scabrid above. Inflorescence in small specimens forming a lax linear spike 3–5 in. long; in larger ones a panicle 4–9 in.; branches few, the lowest sometimes 2 in. long. Spikelets $\frac{1}{4}$ – $\frac{1}{3}$ in. long, numerous, usually rather distant, pale, few-flowered, either androgynous with the male flowers at the top, or some (usually the upper) wholly male; and others (usually the lower) wholly female; bracts very long, foliaceous, often exceeding the panicle. Glumes ovate-lanceolate, long-acuminate, membranous, pale, almost hyaline. Utricle narrow-lanceolate, narrowed at the base, plano-convex, nerved, gradually tapering upwards into a long subulate bidentate beak, the margins of which are ciliate-serrate. Styles 2. Nut dark-brown, oblong, lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 429.

SOUTH ISLAND: Not uncommon in mountain districts throughout. 800–3500 ft. December–February.

Closely allied to the preceding species, but amply distinct in the larger size and coarser habit, broader flatter leaves, and usually paniculate inflorescence.

8. *C. teretiuscula*, Good. in *Trans. Linn. Soc.* ii. (1794) 163.—Rhizome creeping and rooting. Culms laxly tufted, not forming dense tussocks, 1–2 ft. high, slender, wiry, triquetrous, grooved, scabrid above. Leaves shorter than the culms, $\frac{1}{2}$ – $\frac{1}{3}$ in. broad, flat, grassy, deeply grooved; margins scabrid. Spikelets small, ovoid, few-flowered, androgynous, male flowers few at the top, brown or brownish-green, collected into a linear-oblong or linear dense or interrupted compound spike $\frac{3}{4}$ – $1\frac{1}{4}$ in. long; bract usually obsolete. Glumes almost equalling the utricles, ovate, acute, membranous, pale-brown; margins broad, pale. Utricle rather small, shortly stipitate, ovoid, gibbous or almost cordate at the base, plano-convex or unequally biconvex, brown, shining, smooth on the flat face, more or less distinctly ribbed on the convex side, narrowed into a rather long almost winged serrate bidentate beak. Styles 2. Nut obovoid, biconvex.—*Hook. f. Fl. Nov. Zel.* i. 281; *Handb. N.Z. Fl.* 313; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 427.

NORTH ISLAND: Swampy places from Lake Taupo southwards, not common. SOUTH ISLAND: Abundant throughout. Sea-level to 3000 ft. December–March.

A common plant in the north temperate zone, but south of the equator only known from New Zealand. It is easily distinguished by the slender wiry habit, usually dense spike-like panicles, small spikelets male at the top, and ovoid turgid long-beaked utricles, smooth on one side, but ribbed on the other.

9. *C. appressa*, *R. Br. Prodr.* 242.—Very stout, harsh and rigid. Rhizome short, creeping. Culms densely tufted, 1–3 ft. high, stout, with the leaves often $\frac{1}{2}$ in. diam. at the base, rigid, grooved, acutely triquetrous with the angles sharply scabrid, leafy at the base. Leaves numerous, usually exceeding the culms, $\frac{1}{2}$ – $\frac{1}{2}$ in. broad, hard, rigid, acutely keeled, grooved; keel and margins scabrid with minute recurved denticles. Spikelets small, very numerous, few-flowered, androgynous, male flowers at the top, collected in a long and narrow spike-like panicle 3–7 in. long, the primary branches erect and appressed to the rachis; bract obsolete. Glumes broadly ovate, acute, concave, membranous, brownish with a pale line down the centre; margins not silvery. Utricle shortly stipitate, broadly ovate, plano-convex, conspicuously many-nerved on each face, contracted into a short 2-toothed beak; margins broad, incurved, conspicuously ciliate-denticulate. Styles 2. Nut elliptic-ovoid, biconvex.—*Raoul, Choix*, 40; *Hook. f. Fl. Antarct. i.* 90; *Fl. Tasm. ii.* 99; *Handb. N.Z. Fl.* 313; *Boott, Ill. Car. i.* 46, t. 119, 120. *C. paniculata*, *F. Muell. Veg. Chath. Is.* 57; *Benth. Fl. Austral. vii.* 440 (not of *Linn.*). *C. paniculata* var. *appressa*, *Cheesem. in Trans. N.Z. Inst. xvi.* (1884) 427.

SOUTH ISLAND: Otago—Near Dunedin, *Petrie! G. M. Thomson!* Catlin's River, *Petrie!* Milford Sound, *Hector.* STEWART ISLAND: *G. M. Thomson!* CHATHAM ISLANDS: *H. H. Travers!* (Panicle larger and laxer, with paler glumes—perhaps a different species, but specimens very immature.) AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant, *Sir J. D. Hooker, Kirk!* November–February.

In my revision of the New Zealand species I followed Baron Mueller and Mr. Benthham in reducing this and the two following species to the northern *C. paniculata*, to which all three are certainly very closely allied. *C. appressa* differs mainly in its greater size, harsher and more rigid habit, broader leaves, longer and more rigid panicle with the branches closely appressed, darker glumes without silvery margins, and by the more strongly nerved utricles, with broader margins. Although these differences are not important, they appear to be constant, and on the whole it is perhaps best to treat both *C. appressa* and the two following species as distinct from *C. paniculata*, although closely related to it. *C. appressa* is also found in temperate Australia and Tasmania.

10. *C. virgata*, *Sol. ex Hook. f. Fl. Nov. Zel. i.* 282.—Culms densely tufted, 1–3 ft. high, trigonous with the angles sharply scabrid, grooved, leafy at the base. Leaves numerous, much exceeding the culms, $\frac{1}{2}$ – $\frac{1}{4}$ in. broad, harsh and rigid, grooved, sharply keeled below, flat above; margins scabrid with numerous sharp recurved denticles. Spikelets small, very numerous, few-flowered, androgynous with the male flowers at the top, arranged in a long and slender spike-like panicle 6–18 in. long; primary

branches of the panicle rigid, erect, closely appressed to the rhachis, the lower usually remote and sometimes conspicuously so. Glumes almost equalling the utricles, broadly ovate, acute or acuminate, concave, membranous, brown with a narrow pale line down the centre; margins not silvery. Utricle stipitate, ovoid or triangular-ovoid, often subcordate at the base, plano-convex, conspicuously many-nerved on both faces, contracted into a short 2-toothed beak; margins incurved, conspicuously ciliate-denticulate. Styles 2. Nut broadly ovoid, biconvex.—*Boott, Ill. Car. i. 46, t. 121, 122; Handb. N.Z. Fl. 313. C. paniculata var. virgata, Cheesem. in Trans. N.Z. Inst. xvi. (1884) 427. C. collata, Boott in Hook. Lond. Journ. Bot. iii. (1844) 417 (name only).*

NORTH AND SOUTH ISLANDS: Abundant in swamps throughout. Sea-level to 3000 ft. November–January.

Very close to *C. appressa*, but the culms are more slender and not so acutely triquetrous, the leaves are narrower, and the panicle much longer and narrower, and not so dense.

11. *C. secta*, *Boott in. Hook f. Fl. Nov. Zel. i. 281.*—A very large species. Rhizomes matted, often forming trunk-like masses 2–4 ft. high and much resembling the stem of a tree-fern. Culms 2–4 ft., slender, inclined or drooping above, trigonous with the angles scabrid, grooved, leafy at the base. Leaves numerous, as long or longer than the culms, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, grooved, keeled below, flat above; margins scabrid. Spikelets very numerous, pale-brown, small, few-flowered, androgynous with the male flowers at the top, arranged in a much and laxly branched often decompound nodding panicle 1–2½ ft. long; the primary divisions usually very long and slender, much branched, the spikelets often remote on the branches. Glumes almost equalling the utricles, broadly ovate, acuminate or cuspidate, thin and membranous, pale-brown with a paler line down the centre and scarious hyaline margins. Utricles rather smaller than those of *C. virgata*, shortly stipitate, broadly ovoid, turgid, plano-convex or unequally biconvex, polished and shining, quite smooth or very indistinctly nerved, contracted into a rather broad 2-toothed beak, the margins of which are ciliate-denticulate. Styles 2. Nut broadly oblong, biconvex.—*Ill. Car. i. 47, t. 123, 124. C. virgata var. secta, Hook. f. Handb. N.Z. Fl. 313. C. paniculata var. secta, Cheesem. in Trans. N.Z. Inst. xvi. (1884) 428.*

NORTH AND SOUTH ISLANDS: Abundant in swamps from the North Cape to Foveaux Strait. Sea-level to 2500 ft. November–January.

Easily distinguished from *C. virgata* by the much larger and laxly branched often decompound nodding panicles, and by the smaller utricles, which are smooth and shining or very indistinctly nerved. The immense tussocks formed by the matted rootstocks are very conspicuous objects in swampy districts, and have had the local name of “nigger-heads” applied to them.

12. *C. inversa*, *R. Br. Prodr.* 242.—Rhizomes long, creeping, often matted and forming a continuous sward. Culms numerous, weak, slender, usually erect, variable in height, 4–18 in., smooth, striate, obtusely trigonous, leafy towards the base. Leaves shorter than the culms, flat or keeled, grassy, $\frac{1}{2}$ – $\frac{1}{6}$ in. broad; margins usually smooth. Spikelets 2–5, crowded into a terminal cluster or spike, rarely a little remote, androgynous, pale-green, ovoid, $\frac{1}{4}$ – $\frac{1}{3}$ in. long; bracts to the 2 or 3 lower ones long and leafy, far overtopping the inflorescence. Glumes ovate, acuminate or cuspidate, membranous, with a narrow green keel and pale almost hyaline margins. Male flowers at the base of the spikelets, usually few, sometimes absent. Utricle compressed, ovate, plano-convex, narrowed into a rather long beak, more or less distinctly nerved on both faces; margins serrulate above; beak 2-fid. Styles 2. Nut lenticular.—*Hook. f. Fl. Nov. Zel.* i. 281; *Handb. N.Z. Fl.* 312; *Boott, Ill. Car.* iv. 151, t. 488; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 425. *C. smaragdina*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 398.

NORTH AND SOUTH ISLANDS: From Mongonui southwards, not uncommon. Sea-level to 3000 ft. November–May.

Recognised without any difficulty by the slender grassy habit, pale spikelets male at the base, and compressed plano-convex beaked utricles. It is a common Australian plant.

13. *C. resectans*, *Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 413.—Forming broad depressed patches often many feet in diam. Rhizome stout, woody, creeping, much branched, clothed with the fibrous remains of the old leaf-sheaths. Culms very short, usually from $\frac{1}{2}$ to $1\frac{1}{2}$ in. high, rarely more, frequently almost wanting. Leaves few, sheathing the whole length of the culm and much longer than it, narrow, sometimes almost filiform, involute; margins scabrid. Spikelets 2–3 or solitary, crowded into a compact head $\frac{1}{4}$ in. long, pale-green, androgynous; bracts 2–3, very long and leafy. Glumes broadly ovate, acuminate or cuspidate; margins thin, pale; keel stout, 1–3-nerved. Male flowers 1–3 at the base of the spikelet, sometimes absent; female flowers 3–8. Utricle ovate below, plano-convex, strongly nerved, narrowed upwards into a long tapering serrate deeply bifid beak. Styles 2. Nut broadly oblong, plano-convex or obscurely trigonous.—*C. inversa* var. *radicata*, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 425.

SOUTH ISLAND: Canterbury—Lake Tekapo, Lake Pukaki, *T. F. C.* Otago—Common in the dry upland plains of the interior, *Petrie!* 500–3000 ft. December–March.

Very close to *C. inversa*, of which Mr. C. B. Clarke considers it to be a variety, but separated by the much smaller size and more rigid habit, wiry almost filiform leaves, short culms sheathed to the top by the leaves, and long-

beaked utricles, which are very sharply toothed above. Depauperated states of *C. Kirkii* resemble it in habit, but can be distinguished by the male flowers being at the top of the spikelets.

14. **C. Colensoi**, *Boott in Hook. f. Fl. Nov. Zel.* i. 281, t. 63B.—Rhizome stout, woody, creeping, often much branched. Culms 3–14 in. high, very slender, almost filiform, weak, flexuous, trigonous, deeply grooved, leafy towards the base. Leaves usually shorter than the culms, but sometimes equalling or even exceeding them, narrow, $\frac{1}{30}$ – $\frac{1}{20}$ in. wide at the base, wiry; margins involute. Spikelets 2–4 or solitary, compacted into a terminal cluster, androgynous, broadly ovoid, turgid, dark-brown, $\frac{1}{4}$ – $\frac{1}{3}$ in. long; bracts 1 or 2, unequal. Glumes broadly ovate, acute or the lower ones cuspidate, membranous; keel narrow, green; sides chestnut-brown; margins broad, white and hyaline. Male flowers at the base of the spikelets, female flowers above. Utricle broadly ovate, plano-convex, not beaked, brown when ripe, smooth, indistinctly nerved; margins serrate above. Styles 2. Nut elliptic-oblong, smooth.—*Hook. f. Handb. N.Z. Fl.* 312; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 425. *C. picta*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 103.

NORTH AND SOUTH ISLANDS: Not uncommon in hilly districts from the Upper Thames southwards. Sea-level to 4500 ft. November–March.

Also in south-eastern Australia, according to Mr. C. B. Clarke.

15. **C. echinata**, *Murr. Prodr. Stirp. Gotting.* 76.—Culms more or less densely tufted, slender, trigonous, leafy at the base, 4–18 in. high. Leaves usually shorter than the culms, flat, grassy, grooved, $\frac{1}{25}$ – $\frac{1}{15}$ in. broad; margins scabrid. Spikelets 3–5, approximate in a terminal spike or a little remote, sessile, androgynous, green or pale-brown, about $\frac{1}{4}$ in. long when mature; lowest bract short, subulate. Glumes ovate, acute or obtuse, membranous, pale-brown or green with a dark-green centre. Male flowers at the base of the spikelets, usually few; females more numerous. Utricle yellowish-green, much longer than its glume, spreading when ripe, giving the spikelet a squarrose appearance, ovate-lanceolate from a rounded and spongy base, plano-convex, many-nerved, narrowed above into a long bidentate beak; margins of the beak acute, minutely scabrid, or nearly smooth in most of the New Zealand specimens. Styles 3. Nut lenticular.—*Benth. Fl. Austral.* vii. 439; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 426. *C. stellulata*, *Good. in Trans. Linn. Soc.* ii. (1794) 144; *Hook. f. Fl. Nov. Zel.* i. 281; *Handb. N.Z. Fl.* 312. *C. debilis*, *Kirk in Trans. N.Z. Inst.* x. (1878) 412 (*name only*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Marshy places from the Upper Thames Valley southwards, not uncommon. Sea-level to 4000 ft. November–March.

Widely distributed in the temperate portions of the Northern Hemisphere, but only known from Australia and New Zealand in the Southern.

16. *C. lagopina*, *Wahl. in Vet. Akad. Nya Handl. Stockh.* (1803) 145.—Culms densely tufted, short, wiry, smooth or scabrid above, leafy at the base, 2–8 in. high. Leaves shorter than the culms, flat, grassy, grooved, $\frac{1}{10}$ – $\frac{1}{10}$ in. broad; margins smooth or nearly so. Spikelets 2–4, rarely more, approximate in a short terminal spike about $\frac{1}{2}$ in. long, sessile, androgynous, red-brown, about $\frac{1}{2}$ in. long; lowest bract short, not exceeding its spikelet. Glumes broadly ovate, obtuse or subacute, membranous, red-brown with a green midrib and pale hyaline margins. Male flowers at the base of the spikelets, females above. Utricle rather longer than its glume, red-brown, elliptic-ovate, plano-convex, not winged, faintly nerved, rather abruptly narrowed into a short slender beak. Styles 2. Nut broad, lenticular.—*Kirk in Trans. N.Z. Inst.* xxvi. (1894) 262; *Petrie in Trans. N.Z. Inst.* xxviii. (1896) 593. *C. Parkeri*, *Petrie in Trans. N.Z. Inst.* xiii. (1881) 332; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 426.

SOUTH ISLAND: Nelson—Dun Mountain Range, *H. H. Travers!* Canterbury—Craigieburn Mountains, *Petrie!* Otago—Hector Mountains, Mount Arnould, near Mount Aspiring, mountains at the head of Lake Wakatipu, *Petrie!* 4000–6000 ft. January–March.

Also found in arctic and alpine Europe, north Asia, and North America, but only known from New Zealand in the Southern Hemisphere. Easily distinguished from *C. leporina*, to which it is allied, by the much smaller size and rounder wingless utricles. Certainly indigenous.

17. *C. leporina*, *Linn. Sp. Plant.* 973.—Culms laxly tufted, stout or rather slender, trigonous, scabrid above, 6–18 in. high. Leaves shorter than the culms, flat, grassy, striate, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad; margins minutely scabrid. Spikelets 4–6, crowded in an oblong lobed spike $\frac{3}{4}$ –1 in. long, sessile, androgynous, ovoid, brownish-green, shining, about $\frac{1}{3}$ in. long; lowest bract like the glumes or rarely with a short leafy point. Glumes oblong-ovate or oblong-lanceolate, acute or subacute, pale-brown with a green midrib and hyaline margins. Male flowers at the base of the spikelets, female above. Utricle equalling its glume, elliptic-ovoid, plano-convex, winged, striate, narrowed into a long beak; margins and beak finely serrulate. Styles 2. Nut oblong, lenticular, shining.—*Cheesem. in Trans. N.Z. Inst.* xiv. (1882) 301; xvi. (1884) 426.

NORTH ISLAND: Auckland—Near Mauku, *H. Carse!* Wellington—Ohariu Valley, *Kirk!* SOUTH ISLAND: Nelson—Not uncommon in the western portion of the district, ascending to 4000 ft. on the Mount Arthur Plateau, *T. F. C.* November–January.

A common plant in northern Europe, north Asia, and some parts of North America. It is probably introduced into New Zealand.

18. *C. Gaudichaudiana*, *Kunth, Enum.* ii. 417. — Rhizome stoloniferous. Culms slender, strict, trigonous, smooth or slightly scabrid above, very variable in height, usually from 4 to 12 in.,

but sometimes dwarfed to 1 or 2 in., at other times attaining 18 in. Leaves shorter or longer than the culms, narrow, flat, grassy, $\frac{1}{20}$ – $\frac{1}{12}$ in. broad. Spikelets 3–5, rarely more or fewer, sessile or the lowest very shortly stalked, erect, close together or a little remote, $\frac{1}{4}$ – $\frac{3}{4}$ in. long; terminal one (and sometimes a smaller one near its base) wholly male, linear or linear-oblong; the rest female, often with a few male flowers at the top, oblong, cylindric; bracts long and leafy, the lowest usually exceeding the inflorescence. Glumes oblong or obovate-oblong, obtuse or very shortly mucronate, shorter than the utricle, dark-purple or purplish-black, usually with a narrow pale midrib and margins. Utricle narrow-ovate to orbicular-ovate, much compressed, conspicuously nerved almost to the apex, green spotted with brownish-red when ripe, upper portion minutely granular-papillose; beak very short, almost wanting, entire or minutely 2-toothed. Styles 2. Nut broadly ovate, plano-convex.—*Hook. f. Fl. Tasm.* ii. 99, t. 151A; *Handb. N.Z. Fl.* 313. *C. vulgaris* var. *Gaudichaudiana*, *Boott, Ill. Car.* iv. 169, t. 567; *Benth. Fl. Austral.* vii. 442; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 429. *C. cæspitosa*, *R. Br. Prodr.* 242 (not of Good.).

NORTH AND SOUTH ISLANDS: Moist places in mountain districts from the Upper Waikato southwards, rarer in the lowlands. Sea-level to 4500 ft. November–February.

Also in Australia and Tasmania, and very closely allied to the almost cosmopolitan *C. vulgaris*, Fries, differing chiefly in the more compressed and conspicuously nerved utricles.

19. *C. subdola*, *Boott in Trans. Linn. Soc.* xx. (1846) 142.—Rhizome creeping, stoloniferous. Culms slender, trigonous, slightly scabrid above, 1–2 ft. high. Leaves usually exceeding the culms, pale-green, soft, grassy, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad; margins scabrid above. Spikelets 4–8, erect, 1–3 in. long; terminal 1–3 male, usually approximate, sessile, very slender, cylindric; the remainder female, usually with a few male flowers at the top, the upper sometimes geminate, sessile or shortly stalked, the lower solitary, often remote, on longer peduncles; bracts very long and leafy, far exceeding the inflorescence. Glumes shorter and narrower than the utricles, oblong, obtuse, emarginate, with an awn of variable length from the centre of the emargination, dark red-brown or purplish-brown usually with a green stripe down the centre. Utricle ovate, much compressed, conspicuously nerved, green or brownish-green, narrowed into a very short entire or minutely 2-toothed beak. Styles 2. Nut broadly ovate, plano-convex.—*Hook. f. Fl. Nov. Zel.* i. 282; *Handb. N.Z. Fl.* 314; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 430.

NORTH ISLAND: Abundant in swamps from the North Cape southwards. Sea-level to 1500 ft. November–January.

Chiefly distinguishable from *C. Gaudichaudiana* by the larger size, more numerous and much longer often stalked spikelets, and by the awn to the glume, although the last is a variable character. Mr. C. B. Clarke considers it to be a variety of *C. Gaudichaudiana*.

20. **C. ternaria**, *Forst. Prodr.* n. 549.—Usually very tall and stout. Rhizome thick, stoloniferous. Culms robust, $1\frac{1}{2}$ –4 ft. high, triquetrous with the angles very sharply scabrid, faces grooved and striate. Leaves numerous, equalling or exceeding the culms, broad, flat, grassy, grooved, $\frac{1}{5}$ – $\frac{1}{2}$ in. broad; margins and midrib beneath sharply scabrid; sheathing scales at the base of the leaves with the margins transversely fibrillose. Spikelets numerous, 8–24, dark-brown, stout, long-stalked, pendulous, 1–4 in. long; upper 1–6 male, solitary or the lower geminate; the remainder female, usually with male flowers at the top, geminate or ternate or even quinate, the lowest on very long peduncles; bracts very long and leafy, overtopping the inflorescence. Glumes lanceolate to oblong-lanceolate or oblong-ovate, obtuse or retuse at the tip, with a stout hispid awn of very variable length but usually exceeding the utricles, dark-brown with a green keel. Utricle ovate, compressed, nerved, brownish, narrowed into a very short beak with an entire mouth. Styles 2. Nut broadly oblong.—*Raoul, Choix*, 40; *Hook. f. Fl. Antarct.* i. 89; *Fl. Nov. Zel.* i. 282; *Handb. N.Z. Fl.* 314; *Boott, Ill. Car.* iv. tt. 596–598; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 431. *C. geminata*, *Schkuhr, Riedgr.* i. 65; *A. Cunn. Precur.* n. 290. *C. polystachya*, *A. Rich. Fl. Nowv. Zel.* 118, t. 21.

Var. **gracilis**, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 431.—Tall, slender. Leaves usually narrower, $\frac{3}{8}$ – $\frac{1}{2}$ in. broad. Spikelets numerous, long, often over 4 in., slender, sometimes barely $\frac{1}{2}$ in. diam.

Var. **pallida**, *Cheesem. l.c.*—Stout. Leaves strict, rigid, often coriaceous. Spikelets fewer, short, pale, on long filiform peduncles. Utricles broader and more turgid, indistinctly nerved, sometimes with serrate margins.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS, ANTIPODES ISLAND.—The typical form and var. *gracilis* abundant throughout, var. *pallida* not uncommon in the mountains of the South Island. Sea-level to 4000 ft. November–February.

Very distinct in its ordinary state, but small slender forms appear to run into *C. subdola* and into the following species.

21. **C. Sinclairii**, *Boott, MS. in. Herb. Kew.*—Rhizome creeping, stoloniferous. Culms slender or rather stout, triquetrous, scabrid above, 6–18 in. high. Leaves shorter or longer than the culms, flat, grassy, striate, $\frac{1}{5}$ – $\frac{1}{8}$ in. broad; margins scabrid; sheaths at the base not transversely fibrillose. Spikelets 4–6, erect or nearly so, short, stalked or the uppermost sessile, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long; terminal 1 or 2 male, very slender; remainder female, usually with a few male flowers at the top, solitary or the upper geminate, rarely compound at the base, the lower usually on longer peduncles.

Glumes oblong or oblong-ovate, tapering upwards, acute or obtuse, not mucronate or the mucro very short and inconspicuous, dark red-brown, unicolorous or with a very narrow pale stripe down the centre. Utricle equalling the glume or barely exceeding it, ovate, much compressed, nerved, narrowed into a short minutely 2-toothed beak. Styles 2. Nut broadly oblong, lenticular.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, Wairau Valley, Hanmer Plains, *T. F. C.* Canterbury—*Sinclair and Haast, n. 138 in Herb. Kew*; Broken River, Lake Tekapo, *T. F. C.* Westland—Okarito, *A. Hamilton!* Otago—*Hector and Buchanan, Petrie!* 1000–3000 ft. December–February.

I am indebted to Mr. C. B. Clarke for supplying me with information respecting this, and for identifying some of my specimens. It appears to be a somewhat critical species, differing from depauperated states of *C. ternaria* in the basal leaf-sheaths not being transversely fibrillose, in the much fewer erect spikelets, and barely awned glumes, &c. From *C. Gaudichaudiana*, large states of which approach it in habit, it is removed by the broader harsher leaves, the spikelets often stalked and geminate, the longer glumes not rounded at the tip, and by the utricle not being granular-papillose.

22. **C. Raoulii**, *Boott in Hook. f. Fl. Nov. Zel. i. 283.*—Yellowish-green or dark-green, laxly tufted, often spreading at the base. Culms rather stout, triquetrous, scabrid on the angles, 9–18 in. high. Leaves longer than the culms, flat, broad, coriaceous, grooved, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, scabrid on the margins and midrib beneath. Spikelets 4–8, all female but usually with a few male flowers below, the uppermost generally with more male flowers below, stout, erect, all approximate and sessile, or less crowded with the lowest one remote and pedunculate, green or greenish-brown, $\frac{1}{2}$ –1 in. long, $\frac{1}{4}$ in. broad; bracts long and leafy. Glumes broadly ovate, thin and membranous, pale-brown, bifid; midrib stout, produced into a short or long hispid awn. Utricle broader and longer than the glumes, elliptic, unequally biconvex, strongly nerved, narrowed into a stout 2-toothed beak; margins serrate above or almost even. Styles 2. Nut broadly oblong, lenticular. — *Hook. f. Handb. N.Z. Fl. 314*; *Cheesem. in Trans. N.Z. Inst. xvi. (1884) 433.* *C. Goyeni, Petrie in Trans. N.Z. Inst. xiv. (1882) 363.*

SOUTH ISLAND: Nelson—Graham River, Wangapeka River, Mount Owen, Jollie's Pass, *T. F. C.*; Fowler's Pass, *Kirk!* Marlborough—Mount Fyffe, *Kirk!* Canterbury—Akaroa, *Raoul*; Southern Alps, *Sinclair and Haast*; Mount Torlesse, *Kirk!* Kowai River, *Cockayne!* Broken River, Upper Waimakariri, Lake Tekapo, Hooker Valley, *T. F. C.* Otago—Lake Wakatipu, Lake Wanaka, Mount Ida, *Buchanan!* *Petrie!* 200–3000 ft. December–February.

A distinct species, easily recognised by the broad flat leaves, by the terminal spikelet being always partly female, and by the strongly nerved elliptic utricles, usually serrate above. Mr. Clarke informs me that all *Raoul's* specimens at Kew have the utricles hairy on the upper half, but I have seen no specimens showing this peculiarity.

23. **C. dipsacea**, *Berggr. in Minneskr. Fisiog. Sällsk. Lund.* (1877) 28, t. 7, f. 8-14.—Densely tufted. Culms slender, smooth, erect, leafy, 1-2 ft. high, scarcely elongating in fruit. Leaves numerous, longer than the culms, rather narrow, $\frac{1}{2}$ - $\frac{1}{3}$ in. broad, flat, keeled, striate; margins and keel sharply scabrid. Spikelets 4-7, close together except the lowest, which is usually remote, dense-flowered, pale or dark-brown; terminal one male, slender, sometimes mixed with female flowers; remainder female, but often with a few male flowers below, short and broad, $\frac{1}{2}$ -1 in. long, sessile or the two lower shortly pedunculate; bracts long and leafy, far overtopping the inflorescence. Glumes rather shorter than the utricles, orbicular-ovate, obtuse, membranous, pale or dark chestnut-brown, midrib vanishing at the apex or shortly excurrent; margins scarious, pale. Utricles densely packed, spreading when ripe, elliptic-ovoid, unequally biconvex or almost plano-convex, smooth, nerveless; margins sharply and distantly serrate above; beak short, 2-toothed. Styles 2. Nut obovoid-oblong, lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 432.

NORTH AND SOUTH ISLANDS: From the Lower Waikato to Foveaux Strait, not uncommon. Sea-level to 3000 ft. November-January.

Very close to *C. testacea*, but usually recognised without difficulty by the densely packed utricles, spreading on all sides when ripe.

24. **C. testacea**, *Sol. ex Boott in Hook. f. Fl. Nov. Zel.* i. 282.—Laxly tufted. Culms very slender, sometimes filiform, smooth or slightly scabrid above, 6-18 in. high, in some varieties elongating in fruit and becoming prostrate, occasionally reaching a length of 4-5 ft. Leaves longer or shorter than the culms, $\frac{1}{5}$ - $\frac{1}{8}$ in. broad, flat, usually keeled, striate; margins harsh and scabrid. Spikelets 3-5, approximate, pale-brown; terminal one male, slender; remainder all female, sometimes with a few male flowers below, rarely above, short and broad, $\frac{1}{2}$ -1 in. long, $\frac{1}{4}$ - $\frac{1}{3}$ in. broad, sessile or the lowest shortly peduncled; bracts long and leafy, far overtopping the inflorescence. Glumes broadly ovate, thin and membranous, deeply emarginate or bifid, with a long or short awn from the centre of the emargination, pale-brown streaked with chestnut, median portion more or less conspicuously 3-nerved. Utricles equalling the glumes or shorter than them, broadly ovate, plano-convex or nearly so, 7-11-nerved on the convex face, polished and shining, purplish at the apex, paler below, or wholly pale-brown; margins more or less distinctly serrate above, rarely even; beak short, with 2 widely divergent teeth. Styles 2. Nut obovoid-oblong, lenticular.—*Hook. f. Handb. N.Z. Fl.* 314 (*in part*); *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 434.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Sea-level to 3500 ft. October-January.

The best marks of this variable plant are the comparatively lax habit, very slender culms which often elongate in fruit and become prostrate, usually aggregated spikelets, and plano-convex utricles with nerved faces and serrate margins.

25. **C. Wakatipu**, *Petrie in Trans. N.Z. Inst.* xiv. (1882) 363. —Laxly tufted, often spreading at the base. Culms short, rather stout, trigonous, smooth, very variable in size, usually 4–8 in. high, but sometimes elongated to 12 or 14 in., and alpine specimens are often dwarfed to 1–2 in. Leaves always much longer than the culms, frequently twice the length, broad, flat, grooved, $\frac{1}{8}$ – $\frac{1}{5}$ in. diam.; margins slightly scabrid. Spikelets 3–6, closely packed, pale- or dark-brown; terminal one (rarely two) male, slender; remainder all female, sometimes with a few male flowers below or rarely above, sessile or the lowest shortly pedunculate, $\frac{1}{3}$ –1 in. long; bracts very long and leafy, far overtopping the spikelets. Glumes broadly ovate, thin and membranous, bifid, pale-chestnut, sometimes dark-brown; midrib stout, ending in a short awn. Utricle broadly elliptic-ovoid, unequally biconvex, strongly 7–11-nerved, pale-brown to dark-brown; margins usually smooth; beak short, 2-toothed. Styles 2. Nut broadly oblong, lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 434.

SOUTH ISLAND: Not uncommon in alpine and subalpine localities throughout. 2500–5500 ft. December–February.

Distinguished from *C. testacea* by the smaller size and more robust habit, broader leaves always much exceeding the culms, closely aggregated spikelets, and more turgid strongly nerved utricles.

26. **C. devia**, *Cheesem. in Trans. N.Z. Inst.* xv. (1883) 301.—Culms laxly tufted, smooth or nearly so, leafy at the base, 6–18 in. high. Leaves shorter than the culms, spreading, rigid and coriaceous, flat or involute, strongly grooved, $\frac{1}{10}$ – $\frac{1}{6}$ in. diam.; margins scabrid. Spikelets 2–4, approximate or the lowest alone remote, dark-brown; terminal one the largest, male, rarely with a few female flowers at the base, rather stout, sometimes almost clavate, $\frac{3}{4}$ –1½ in. long; remainder all female, erect, oblong, $\frac{1}{2}$ –1 in. long, sessile or the lowest very shortly pedunculate; lowest bract long and leafy, the rest small. Glumes dark-brown with a pale centre, ovate, acute, emarginate or shortly bifid, the midrib produced into a hispid awn of varying length. Utricle equalling the glumes or rather longer than them, elliptic-ovoid, unequally biconvex or almost plano-convex, strongly nerved on both faces, purplish-black; margins entire; beak short, bifid. Styles 2. Nut broadly obovoid-oblong, compressed.—*Trans. N.Z. Inst.* xvi. (1884) 433.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, St. Arnaud Mountains, Raglan Range, *T. F. C.*; Dun Mountain, *H. H. Travers*! D'Urville Island, *H. B. Kirk*! 1000–3000 ft. December–January.

Mr. C. B. Clarke considers this to be a variety of *C. lucida*, to which it approaches very closely in the glumes and utricles. But the habit is altogether

different, being nearer to some states of *C. testacea*, the leaves are shorter and broader and more coriaceous, the spikelets are fewer in number and shorter and broader, the terminal male one being often clavate, and the utricles are conspicuously nerved on both faces.

27. *C. lucida*, Boott in Hook. f. *Fl. Nov. Zel.* i. 283.—Densely tufted, usually forming large tussocks. Culms very slender, leafy, smooth or slightly scabrid above, in the flowering stage 12–24 in. high and usually overtopped by the leaves, in fruit often but not invariably elongating and becoming prostrate, sometimes reaching a length of 4 or 5 ft. or even more. Leaves numerous, spreading or drooping at the tips, narrow, $\frac{1}{15}$ – $\frac{1}{8}$ in. broad, keeled; margins and keel sharply scabrid. Spikelets 4–8, narrow, erect, cylindric, $\frac{1}{2}$ –2 in. long, pale-brown to dark-brown; upper 1–3 male, very slender, unequal in length, close together; remainder female but occasionally with a few male flowers below or rarely at the top, almost sessile or on peduncles of varying length, usually rather distant, the lowermost often remote and occasionally compound at the base; bracts very long and leafy. Glumes broadly ovate, acute or obtuse, rarely very shortly emarginate, cuspidate with a short hispid awn, pale or dark chestnut-brown with a pale keel. Utricle about as long as the glume, elliptic-ovoid, unequally biconvex, smooth or obscurely nerved on the rounded face, shining, from purplish-black to pale-brown; margins smooth; beak short, acutely bidentate. Styles 2. Nut broadly oblong, biconvex.—Hook. f. *Handb. N.Z. Fl.* 314; Cheesem. in *Trans. N.Z. Inst.* xvi. (1884) 432. *C. flagellifera*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 342.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards, abundant. Sea-level to 3000 ft. October–January.

A well-known species, easily distinguished by the slender culms, narrow keeled leaves, distant long and narrow spikelets, usually entire glumes, and turgid smooth and polished utricles.

28. *C. Buchanani*, Berggr. in *Journ. Bot.* xviii. (1880) 104.—Densely tufted, usually reddish-purple, rarely whitish-green. Culms closely packed, slender, strict, erect, 1–2 ft. high, quite smooth. Leaves equalling the culms or longer than them, narrow, strict, semiterete, grooved on the convex face, $\frac{1}{20}$ – $\frac{1}{12}$ in. broad; margins scabrid. Spikelets 4–6, linear-oblong, erect, cylindric, $\frac{1}{2}$ –1½ in. long, remote or the upper approximate, pale whitish-green; terminal 1 or rarely 2 male, very slender; remainder female, usually with a few male flowers below, sessile or the lowest shortly pedunculate; bracts long and leafy. Glumes longer than the utricles, broadly ovate with a long hispid awn, pale, membranous; margins lacerate. Utricle elliptic, plano-convex, smooth or faintly nerved on the convex face, spotted with dark-purple; margins ciliate-serrate above; beak rather long, deeply

bifid. Styles 2. Nut obovoid-oblong, plano-convex.—*Trans. N.Z. Inst.* xiii. (1881) 290; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 431. *C. tenax*, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 27, t. 7, f. 1-7 (not of *Chapm.*).

SOUTH ISLAND: Abundant in hilly and mountainous districts throughout. Sea-level to 3500 ft. December-January.

The chief characters of this species are the strict erect habit, semiterete leaves, pale-coloured glumes, and elliptic plano-convex utricles, the margins of which are serrate above. The reddish-purple colour, which is often constant through large districts, is also seen in *C. comans*, *C. Petriei*, *C. uncifolia*, and others. It probably occurs in the mountainous centre of the North Island, but I have seen no specimens from thence.

29. *C. cirrhosa*, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 29, t. 7, f. 27-34.—A dwarf species forming compact glaucous-green or reddish tufts. Culms very short, densely packed, 1-1½ in. high, leafy throughout. Leaves longer than the culms, narrow, flat or almost plano-convex, grooved; tips obtuse, curled and twisted when dry; margins scabrid. Spikelets 4-5, approximate and almost concealed by the leaves, ½-⅓ in. long; terminal one male, slender; remainder all female, with or without a few male flowers below, all sessile or the lowest very shortly peduncled; bracts leafy, far exceeding the spikelets. Glumes ovate-lanceolate, entire, cuspidate, whitish-green with a darker midrib. Utricle about equalling the glumes, elliptic-ovoid, plano-convex, nerved, pale, narrowed into a rather long acutely bidentate beak; margins entire or minutely denticulate. Styles 2. Nut lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 435.

Var. *lutescens*, *Kukenthal, MS.*—Culms taller, 2-4 in. high. Spikelets longer and further apart, the lowest one sometimes remote. Utricle narrow-elliptic; beak longer.

SOUTH ISLAND: Canterbury—Upper Waimakariri and Lake Lyndon, *Berggren! Enys! Kirk! Cockayne, T. F. C.* December-February.

A very peculiar little plant.

30. *C. rubicunda*, *Petrie in Trans. N.Z. Inst.* xxxi. (1899) 353.—Forming small reddish-brown tufts. Culms short, strict, erect, quite smooth, leafy, 2-4 in. high. Leaves equalling the culms or longer than them, narrow, ⅓-⅔ in. broad, convex at the back, concave in front, grooved; tips curled and twisted when dry; margins smooth. Spikelets 4-5, all closely approximate and sessile, or the lowest remote and shortly pedunculate, short, ⅓-¼ in. long; terminal one male; remainder female; bracts long, leafy. Glumes broadly ovate, entire, shortly cuspidate, pale. Utricle equalling the glumes, ovoid or elliptic-ovoid, unequally biconvex, smooth or faintly nerved, reddish-brown; margins smooth, even; beak very short, minutely bidentate. Styles 2. Nut lenticular.—*C. novæ-zealandiæ*, *Petrie in Trans. N.Z. Inst.* xxv. (1893) 273 (not of *Boeckl.*).

NORTH ISLAND: Opepe, near Lake Taupo, *T. F. C.* SOUTH ISLAND: Otago—Marshy places on the shores of Lake Te Anau, *Petrie*! January–February.

Mr. C. B. Clarke suggests that this should be merged with *C. cirrhosa*, to which it is doubtless very closely allied. But the utricles are much more turgid and distinctly biconvex, and the beak very short and not so acutely bidentate. The habit is that of depauperated states of *C. Petriei*, but the spikelets are much smaller and closer together and usually sessile, the styles are 2, and the utricles are generally faintly nerved.

31. *C. Berggreni*, *Petrie in Trans. N.Z. Inst.* xviii. (1886) 297. —Small, reddish-brown or green, forming broad depressed tufts. Culms branched at the base, very short, stout, spreading, sheathed to the top by the leaves, $\frac{1}{2}$ – $1\frac{1}{2}$ in. high. Leaves spreading, exceeding the culms, 1–2 in. long, $\frac{1}{20}$ – $\frac{1}{12}$ in. broad, linear, quite flat, obtuse, deeply striate, coriaceous; margins smooth or serrate above. Spikelets 2–3, small, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, usually approximate, all shortly peduncled or almost sessile, red-brown; terminal one male; the remainder female; bracts short, broad. Glumes broadly ovate, obtuse or very shortly cuspidate, membranous, chestnut-brown, usually with a green midrib and paler margins. Utricles rather longer than the glumes, elliptic, biconvex or obscurely trigonous, indistinctly nerved, dark red-brown or almost black above, paler towards the base; margins smooth; beak almost wanting, minutely bifid. Styles 2 or 3. Nut acutely trigonous.

SOUTH ISLAND: Canterbury—Margins of lagoons near the Cass River, Lake Tekapo, *T. F. C.* Otago—Mount Pisa, Old Man Range, Mount Kyeburn, *Petrie*! 2500–5000 ft. December–February.

One of the most distinct species of the genus. The linear flat leaves, of uniform width throughout, and very obtuse at the tip, are unmistakable. The styles are sometimes 2, sometimes 3, but the acutely trigonous nut shows that the alliance of the species is with the 3-styled division of the genus. My Cass River specimens have narrower leaves and more closely compacted spikelets, and are placed by Kukenthal as var. *angustifolia*.

32. *C. Hectori*, *Petrie in Trans. N.Z. Inst.* xxvii. (1895) 405. —Culms densely tufted, branched at the base, erect, leafy throughout, 1–3 in. high. Leaves exceeding the culms, green, erect, rigid, flat, striate, about $\frac{1}{20}$ in. broad; tips subacute; margins scabrid above. Spikelets 3–4, closely approximate, small, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, red-brown; terminal one male, erect; remainder all female, spreading, ovoid-oblong, sessile or the lowest very shortly pedunculate; bracts long, leafy, overtopping the spikelets. Glumes ovate, acuminate or cuspidate with the stout excurrent midrib, membranous, chestnut-brown with a paler midrib and margins. Utricles narrow-ovoid, trigonous, strongly nerved, narrowed at the base and upwards into an acutely 2-toothed beak; margins ciliate-serrate above. Styles 3. Nut trigonous.

SOUTH ISLAND: Otago—Old Man Range, altitude 5000 ft., *Petrie*!

In the leaves and arrangement of the spikelets this approaches *C. decurtata*, but the narrow-ovoid trigonous utricle with its long serrate beak is quite different from the broad plano-convex utricle of *C. decurtata*. From *C. uncifolia* it also differs in the slender serrate beak of the utricle. From *C. Berggreni* it is removed by the green tapering acute leaves, and larger long-beaked utricles.

33. *C. decurtata*, Cheesem. in Trans. N.Z. Inst. xxiv. (1892) 414.—Small, densely tufted, glaucous-green. Culms short, 1–3 in. high, usually sheathed to the top by the leaves. Leaves numerous, much exceeding the culms, 2–6 in. long, $\frac{1}{25}$ – $\frac{1}{15}$ in. broad, flat, or concave in front and convex behind, rigid, coriaceous, grooved; tips incurved when dry; margins scabrid. Spikelets 3–5, usually concealed amongst the leaves, short, stout, about $\frac{1}{4}$ in. long, very closely approximate; terminal one male, erect; remainder all female, spreading, ovoid or ovoid-oblong, sessile or the lowest very shortly pedunculate. Glumes broadly ovate or almost orbicular, acute or cuspidate, thin and membranous, reddish-brown or chestnut with a paler centre and margins. Utricles rather longer than the glumes, broadly ovoid or elliptic-ovoid, plano-convex or unequally biconvex, turgid on the back, obscurely nerved; margins thick, serrate above; beak short, stout, sharply bidentate. Styles 3. Nut sharply trigonous. *C. cryptocarpa*, Cheesem. in Trans. N.Z. Inst. xvi. (1884) 412, 435 (not of C. A. Mey.).

SOUTH ISLAND: Canterbury—Margins of ponds near Lake Tekapo, altitude 2500 ft. December–February.

A very curious and distinct little species.

34. *C. uncifolia*, Cheesem. in Trans. N.Z. Inst. xvi. (1884) 412.—Brownish-red or green, forming lax or dense spreading tufts. Culms short, 1–4 in. high, usually sheathed to the top by the leaves. Leaves numerous, spreading, far exceeding the culms, 3–10 in. long, $\frac{1}{30}$ – $\frac{1}{15}$ in. broad, rarely narrower and filiform, concave in front, convex on the back, grooved, tips often curled and twisted when dry; margins finely scabrid above. Spikelets 3–5, short, closely approximate or sometimes the lowest one remote, chestnut-brown to dark-brown, $\frac{1}{6}$ – $\frac{1}{4}$ in. long; terminal one male, slender, erect; remainder all female, spreading, ovoid or oblong, all sessile or the lowest very shortly pedunculate. Glumes ovate, obtuse or cuspidate, membranous, chestnut-brown with a green centre; margins sometimes erose. Utricles longer than the glumes, narrowed at the base, elliptic-oblong, trigonous, more or less distinctly nerved, reddish-brown to blackish-brown, rarely pale; margins rounded, entire; beak very short, with an almost entire or obscurely 2-toothed mouth. Styles 3. Nut obovoid, trigonous.—Trans. N.Z. Inst. xxiv. (1892) 415.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Apparently not uncommon in mountain districts throughout. 2000–4000 ft. December–February.

35. **C. Dallii**, *T. Kirk in Trans. N.Z. Inst.* xxvi. (1894) 261.— Small, slender, laxly tufted, usually reddish-brown. Culms very slender, smooth, grooved, 4–10 in. high. Leaves shorter than the culms or almost equalling them, sheathing at the base, narrow, $\frac{1}{30}$ – $\frac{1}{15}$ in. broad, concave in front, convex behind, grooved, narrowed into long filiform points; margins slightly scabrid above. Spikelets 3–5, narrow, $\frac{1}{4}$ – $\frac{2}{3}$ in. long, more or less distant, the lowermost often almost basal, dark red-brown; terminal one male, slender; remainder all female, sometimes with a few male flowers below, sessile except the lowest, which is on a long filiform peduncle; bracts long, leafy. Glumes ovate, acuminate or slightly awned, membranous, reddish-brown. Utricles narrow-ovoid, obscurely trigonous, smooth or faintly nerved, dark purplish-black; margins entire; beak sharply 2-toothed. Styles 3. Nut trigonous.—*C. Traversii*, *Kirk in Trans. N.Z. Inst.* xxvi. (1894) 262.

SOUTH ISLAND: Nelson—Source of the Heaphy River, *Dall*! Dun Mountain, *H. H. Travers*! 2500–4000 ft. December–February.

I cannot see upon what grounds Mr. Kirk's *C. Traversii* can be separated from *Dall*'s Heaphy River specimens. Both are very near to *C. Petriei*, principally differing in the more slender habit, more distant spikelets, the lowermost one almost basal, darker glumes, and rather narrower utricles.

36. **C. Petriei**, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 413.— Densely tufted, usually brownish-red. Culms stout or rather slender, quite smooth, deeply grooved, leafy, 5–15 in. high. Leaves numerous, longer or shorter than the culms, broad and sheathing at the base, blade narrow, $\frac{1}{30}$ – $\frac{1}{10}$ in. broad, deeply grooved, concave in front, convex behind, narrowed into long slender points that are usually curled and twisted when dry; margins scabrid. Spikelets 3–5, narrow-oblong, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, more or less approximate but not closely so, the lower one often remote; terminal one male, slender; remainder all female, sometimes with a few male flowers at the base, all stalked, but the stalks of the upper ones sometimes very short; bracts long, leafy. Glumes ovate, acute or shortly cuspidate, thin and membranous, pale, often almost white, but usually more or less stained with chestnut, rarely chestnut-brown; margins often lacerate. Utricles longer than the glumes, narrow-ovoid or elliptic-oblong, biconvex, rather turgid, smooth or obscurely nerved, shining, dark purplish-brown or almost black; margins entire; beak short, 2-toothed. Styles 3. Nut elliptic, trigonous.

SOUTH ISLAND: Not uncommon in mountain districts, from Nelson to the south of Otago. 2000–5000 ft. December–February.

Characterized by the broad sheathing-base of the leaves, and their fine curled and twisted points; by the rather small and narrow spikelets, all of which are stalked, and the lower on filiform peduncles; by the usually pale-coloured glumes; and by the narrow-ovoid or elliptic turgid utricles, which are dark purplish-brown or almost black.

37. **C. comans**, *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 28, t. 7, f. 15-19.—Densely tufted, pale-green or reddish. Culms very slender, filiform, quite smooth, leafy, usually 6-18 in. high, but sometimes elongating in fruit and prostrate. Leaves longer or shorter than the culms, very narrow, filiform, $\frac{1}{30}$ – $\frac{1}{15}$ in. broad, flat or concave in front, slightly rounded at the back, grooved and striate; margins scabrid. Spikelets 5-7, linear-oblong, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad; terminal one (rarely two) male, very slender; remainder all female, sometimes with a few male flowers at the base, usually distant, the lowermost sometimes almost basal, the upper two sessile, the rest on filiform peduncles, that of the lowermost often elongate; bracts long, filiform, far overtopping the spikelets. Glumes ovate, usually bifid, with a short hispid awn, membranous, pale-brown or red-brown; margins lacerate. Utricles rather longer than the glumes, lanceolate or elliptic-lanceolate, plano-convex or unequally biconvex, smooth or obscurely ribbed on the convex face, gradually narrowed into a rather long bidentate beak; margins sharply serrate above. Styles 3. Nut trigonous.—*Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 436. *C. Cheesemanii*, *Petrie in Trans. N.Z. Inst.* xv. (1883) 358; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 437.

Var. **pulchella**, *C. B. Clarke, MS.*—Smaller. Spikelets usually 4, the lowermost remote and basal. Utricles shorter and broader, ovate-oblong, often smooth; beak shorter.—*C. pulchella*, *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 29, t. 7, f. 20-26.

Var. **stricta**, *Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 415.—Pale whitish-green. Culms short, 4-8 in. high, barely half the length of the strict erect leaves. Spikelets and glumes shining whitish-green. Utricles larger and broader, elliptic-ovoid, pale. Perhaps a distinct species.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from Ahipara and Mongonui southwards. Var. *pulchella*: Bealey, *Berggren!* Maniototc Plain, *Petrie!* Var. *stricta*: Lake Tekapo, *T. F. C.* Sea-level to 3500 ft. November-February.

A very variable species, best separated from its allies by the filiform culms and leaves, narrow rather remote spikelets, and lanceolate or elliptic-lanceolate utricles, sharply toothed above. Mr. Petrie's *C. Cheesemanii* usually has longer culms and rather broader utricles, but passes so gradually into the type that it cannot be distinguished even as a variety. I have followed Mr. C. B. Clarke in reducing *Berggren's C. pulchella* to *C. comans*, the differences between the two being of no very great importance.

38. **C. plesiostachys**, *C. B. Clarke MS. in Herb. Kew.*—Pale-green, densely tufted, with much of the habit of *C. comans*. Culms short, slender, quite smooth, leafy almost to the top, 4-9 in. long. Leaves much exceeding the culms, 12-20 in. long, narrow, $\frac{1}{20}$ – $\frac{1}{15}$ in. broad, flat in front, slightly convex behind, grooved; margins slightly scabrid. Spikelets 5-6, pale stramineous, closely approximate, the lowest not remote, $\frac{1}{3}$ – $\frac{3}{4}$ in. long; terminal one male, slender; remainder all female, sometimes with a few male flowers

at the base, sessile or the lowest very shortly pedunculate; bracts long and leafy. Glumes broadly ovoid, pale-coloured, membranous, shortly bifid, midrib produced into a long or short awn usually exceeding the utricles; margins lacerate. Utricle elliptic-ovoid, unequally biconvex, smooth, turgid, gradually narrowed into a rather long acutely bidentate beak; margins entire. Styles 3. Nut trigonous.

SOUTH ISLAND: Otago—Milford Sound, *Kirk*!

Specimens of this collected by Mr. Kirk are in my own and in the Kew Herbarium, and I have adopted Mr. Clarke's manuscript name for it. It is evidently very close to *C. comans* var. *stricta*, principally differing in the closely aggregated spikelets and broader utricles, which are not serrate above.

39. *C. litorosa*, *Bailey in Memoirs Torrey Club* (1889) 72.—Pale-green, forming compact tufts. Culms densely packed, slender, erect, terete, grooved, quite smooth, leafy, 9–24 in. high. Leaves as long or longer than the culms, sheathing at the base, narrow, $\frac{1}{30}$ – $\frac{1}{12}$ in. broad, deeply grooved, flat or concave in front, convex behind, narrowed into long filiform points; margins slightly serrate above. Spikelets 3–5, the lowermost often remote, the others closely placed or a little distant, oblong-ovate, $\frac{1}{4}$ – $\frac{3}{4}$ in. long; terminal one male, slender; remainder all female, usually with male flowers either above or below, sessile or the lowermost shortly pedunculate; bracts very long and leafy. Glumes ovate, acuminate with a short or long awn, membranous, pale-brown; margins often lacerate. Utricles as long or rather longer than the glumes, broadly ovoid, turgid, biconvex, smooth or obscurely nerved, reddish-brown; margins smooth; beak short and stout, with 2 divergent teeth. Styles 3. Nut obovoid, trigonous.—*Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 415. *C. littoralis*, *Petrie in Trans. N.Z. Inst.* xv. (1883) 358; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 437 (*not of Schwein.*). *C. australis*, *Kirk in Trans. N.Z. Inst.* xxvi. (1894) 262 (*not of Boeckel.*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in brackish-water marshes from the Kaipara Harbour southwards. October–January.

Distinguished from *C. comans* by the larger size and stouter habit, broader spikelets, and especially by the broader and more turgid biconvex utricles, with entire margins and smooth or very obscurely nerved faces. The Otago and Stewart Island specimens have rather larger spikelets, with male flowers at the base of the female spikelets, whereas they are usually at the top in northern specimens.

40. *C. dissita*, *Sol. ex Hook. f. Fl. Nov. Zel.* i. 284.—Densely tufted. Culms slender, smooth, leafy, 1–2½ ft. high. Leaves longer or shorter than the culms, dark-green, flat, broad, grassy, deeply grooved, $\frac{1}{8}$ – $\frac{1}{4}$ in. diam.; margins scabrid above. Spikelets 4–8, distant, $\frac{1}{3}$ –1 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, dark-brown; terminal one male, slender, rarely with 1 or 2 much smaller ones near its

base; remainder all female, but often with male flowers below, rarely at the top, shortly peduncled and erect, or the lower on longer peduncles and nodding; bracts long, leafy. Glumes broadly ovate, deeply bifid or almost entire, membranous, dark chestnut-brown with paler margins; midrib stout, produced into a short or rather long stout hispid awn. Utricles about equalling the glumes, ovoid, turgid, biconvex, obscurely nerved, pale- or dark-brown, sometimes almost black; margins often serrate above; beak short, with 2 stout often widely divergent teeth. Styles 3. Nut ovoid, trigonous.—*Handb. N.Z. Fl.* 316; *Boott, Ill. Car.* i. t. 176; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 437. *C. longaeacuminata*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 104. *C. polyneura*, *Col. l.c.* *C. australis*, *Boeck. Cyp. Berol.* n. 298.

Var. *Lambertiana*, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 437.—Stouter. Leaves broader, $\frac{1}{2}$ – $\frac{3}{4}$ in. Spikelets longer and stouter, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. long. Glumes more deeply bifid.—*C. Lambertiana*, *Boott in Hook. f. Fl. Nov. Zel.* i. 284; *Ill. Car.* i. t. 177; *Hook. f. Handb. N.Z. Fl.* 317.

Var. *ochrosaccus*, *Cheesem.*—Culms usually overtopped by the leaves. Spikelets 4–9, pale, erect, short-stalked, lower often compound. Glumes with longer awns exceeding the utricles. Utricles pale, rather narrower.—*C. ochrosaccus*, *C. B. Clarke MS. in Herb. Kew.*

Var. *monticola*, *Kukenthal, MS.*—Smaller, 6–18 in. high. Leaves narrower. Spikelets 3–5, small, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, sessile or very shortly peduncled.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: The typical form and var. *Lambertiana* abundant throughout. Var. *ochrosaccus*: Whangarei, *Carse!* Kaipara, *Kirk!* vicinity of Auckland, *T. F. C.* Var. *monticola*: Not uncommon in turfey swamps in the mountains of both Islands. Sea-level to 3500 ft. October–January.

A most abundant and variable species. It can be distinguished from its allies by the broad flat grassy leaves, usually solitary male spikelets, distant stout dark-coloured female spikelets, which are generally on short peduncles, broad often deeply bifid glumes with a hispid awn of varying length, and broadly ovoid turgid utricles, which are usually obscurely nerved.

41. **C. *Solandri***, *Boott in Hook. f. Fl. Nov. Zel.* i. 284.—Densely tufted. Culms tall, slender, trigonous, slightly scabrid above, leafy, 1–3 ft. high, often elongating in fruit and becoming prostrate. Leaves long, narrow, keeled, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad; margins and keel sharply scabrid. Spikelets 5–10, distant, on long slender peduncles, long and narrow, $\frac{3}{4}$ –2 in. long by about $\frac{1}{5}$ in. broad, dark-brown; terminal 1–4 male, slender, usually closely placed; remainder all female, but generally with a few male flowers below, nodding, the 2 or 3 lowest often compound, on longer filiform peduncles; bracts long and leafy. Glumes broadly ovate, entire or bifid, membranous, dark or pale chestnut-brown; midrib produced into an awn of variable length. Utricles about equalling the glumes, ovoid, turgid, unequally biconvex or obscurely trigonous, dark red-brown or purplish-black, rarely pale-brown, narrowed into a short sharply bidentate beak; margins smooth or serrate above.

Styles 3. Nut ovoid, trigonous.—*Boott, Ill. Car. i. 61, t. 175; C. Neesiana, Hook. f. Handb. N.Z. Fl. 316; Cheesem. in Trans. N.Z. Inst. xvi. (1884) 438 (not of Endl.).*

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon from Ahipara and Mongonui southwards, usually in woods. Sea-level to 2000 ft. October–January.

Allied to *C. dissita*, from which it differs in the taller and more slender habit, in the male spikelets usually more than one, and in the longer and narrower female spikelets, the 2 or 3 lower of which are often compound. The utricles are also rather smaller, and less conspicuously nerved than in *C. dissita*. In my Revision of the New Zealand species I followed Sir J. D. Hooker in uniting it with the Norfolk Island *C. Neesiana*; but since then I have obtained specimens of that species, and find it to differ so much in leaves, spikelets, and utricles that I can entertain no doubt as to the distinctness of the two plants.

42. *C. ventosa*, *C. B. Clarke MS. in Herb. Kew.*—Tall, stout, robust, leaves broad. Inflorescence 12–14 in. long. Spikelets 8, $\frac{3}{4}$ –3 in. long, pale; terminal 2–3 male, slender; remainder all female, short-peduncled, erect, not pendulous. Utricles elliptic-oblong, trigonous, narrowed at both ends, stramineous, 12-nerved, glabrous; beak very short. Nut blackish, elliptic-oblong, trigonous.

CHATHAM ISLANDS (?): *Travers in Herb. Kew.*

This is quite unknown to me, and the above brief diagnosis has been framed from notes kindly supplied by Mr. C. B. Clarke, who remarks that it is nearest to the true *C. Neesiana* (of Norfolk Island), but differs in the larger and narrower utricles.

43. *C. longiculmis*, *Petrie in Trans. N.Z. Inst. xiv. (1882) 363.*—Tall, densely tufted. Culms terete or nearly so, smooth, 2–3 ft. high or more, leafy at the base. Leaves shorter than the culms or equalling them, pale-green, sheathing at the base, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad, flat or keeled, striate; margins slightly scabrid above. Spikelets 5–7, the lowermost usually distant, the remainder approximate; terminal one male, slender, 1–2 in. long, sometimes with a smaller one near its base; remainder all female, usually with a few male flowers at the base, rarely at the top, very large and stout, $\frac{3}{4}$ –1 $\frac{1}{2}$ in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, pale-brown, sessile or the lowest shortly peduncled; bracts leafy, far exceeding the inflorescence. Glumes broadly ovate, membranous, pale chestnut-brown, midrib produced into a stout hispid awn. Utricle equalling the glumes, somewhat stipitate, ovoid, biconvex, nerved, pale- or dark-brown, suddenly contracted into a rather long and stout bidentate beak; margins smooth. Styles 3. Nut trigonous.—*Cheesem. in Trans. N.Z. Inst. xvi. (1884) 438.*

STEWART ISLAND: Paterson's Inlet, *Petrie*! *G. M. Thomson*! Glory Cove, *Kirk*!

A very distinct species, perhaps nearest to *C. litorosa*, but much larger in all its parts.

44. **C. trifida**, *Cav. Ic. v. 41, t. 465*.—A very tall and stout species, forming dense tussocks 1–2 ft. diam. Culms stout, erect, 2–4 ft. high, obtusely trigonous, quite smooth, thickened at the base, copiously leafy. Leaves very large, overtopping the culms, 3–6 ft. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, sheathing at the base, keeled, rigid, striate; margins scabrid. Spikelets 6–12, very large and stout, 3–5 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad; upper 2–4 male, rather closely placed, sessile or nearly so; lower 4–6 female, further apart, shortly stalked, the lowest often compound; bracts long, leafy. Glumes linear-oblong or lanceolate, deeply bifid, membranous, chestnut-brown; midrib produced into a long hispid awn. Utricle shorter than the glumes or almost equalling them, stipitate and attenuate at the base, oblong-obovoid, turgid, obsoletely trigonous, strongly nerved, rather abruptly contracted into a 2-toothed beak. Styles 3. Nut obovoid-oblong, trigonous.—*Raoul, Choix*, 40; *Hook. f. Fl. Antarct. i. 89*; *Fl. Nov. Zel. i. 284*; *Handb. N.Z. Fl. 316*; *Cheesem. in Trans. N.Z. Inst. xvi. (1884) 439*. *C. incrassata*, *Sol. ex Boott, Ill. Car. iv. 138*.

SOUTH ISLAND: Marlborough—Queen Charlotte Sound, *Banks and Solander*. Canterbury—Akaroa, *Raoul*. Otago—Near Dunedin, *Buchanan! Lindsay, Petrie!* Bluff Hill, *Kirk!* Dusky Sound, *Lyall*. STEWART ISLAND: *Petrie!* THE SNARES, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Not uncommon, *Sir J. D. Hooker, Kirk!*

Also in temperate South America, from Chili to Fuegia and the Falkland Islands. The large size, stout habit, and numerous massive spikelets readily distinguish it from any other species found in New Zealand.

45. **C. breviculmis**, *R. Br. Prodr. 242*.—Culms short, tufted, erect or spreading from the base, 1–6 in. high. Leaves very much longer than the culms, spreading, $\frac{1}{2}$ – $\frac{1}{2}$ in. broad, flat, grooved; margins slightly scabrid above. Spikelets 2–5, small, green; approximate, $\frac{1}{6}$ – $\frac{1}{3}$ in. long; terminal one male; remainder all female, sometimes with male flowers at the top, erect, sessile or the lowest very shortly pedunculate; bracts long, narrow, leafy. Glumes laxly imbricate, ovate, pale-green, membranous; midrib stout, produced into a long hispid awn. Utricles shorter than the glumes, stipitate, narrow-elliptic, trigonous, faintly many-nerved, green, pubescent, narrowed upwards into a short pyramidal beak. Styles 3. Nut elliptic-obovoid, trigonous; style-base dilated just above the top of the nut.—*Hook. f. Fl. Nov. Zel. i. 283, t. 63A*; *Handb. N.Z. Fl. 316*; *Fl. Tasm. ii. 101*; *Benth. Fl. Austral. vii. 445*; *Boott, Ill. Car. iv. 181*; *Cheesem. in Trans. N.Z. Inst. xvi. (1884) 439*.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape to Foveaux Strait. Sea-level to 3000 ft. October–March.

Easily recognised by the small size and pubescent utricles. Also found in Australia and Tasmania, the Himalaya Mountains, China, and Japan.

46. **C. pumila**, *Thunb. Fl. Jap.* 39.—Rhizome long, creeping, often many feet in length. Culms short, stout, 4–8 in. high, leafy throughout. Leaves much longer than the culms, $\frac{1}{15}$ – $\frac{1}{8}$ in. broad, rigid, keeled, grooved, glaucous-green, recurved above, tapering into long subulate points. Spikelets 3–6, approximate; terminal one male, slender, $\frac{3}{4}$ –1 in. long, often with one or two much smaller ones near its base; remainder all female, sometimes with male flowers at the top, oblong, stout, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, sessile or the lowest shortly pedunculate; bracts long and leafy. Glumes ovate-oblong, membranous, chestnut-brown with pale hyaline margins; midrib stout, produced into a short awn or barely excurrent. Utricle very large, much exceeding the glumes, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, thick and corky, turgid, ovoid, smooth or obsoletely nerved, brown, narrowed into a short bidentate beak. Styles 3. Nut brown, ovoid, trigonous.—*Boott, Ill. Car.* iv. 217; *Hook. f. Handb. N.Z. Fl.* 315; *Benth, Fl. Austral.* vii. 445; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 439. *C. littorea*, *Lab. Pl. Nov. Holl.* ii. 69, t. 219; *Raoul, Choix*, 40; *Hook. f. Fl. Nov. Zel.* i. 284.

NORTH AND SOUTH ISLANDS: Sandy shores from the North Cape to Foveaux Strait, abundant. October–January.

Very distinct from any other New Zealand species. The long running rhizomes, glaucous keeled leaves, and large smooth and turgid utricles are conspicuous characters. Common in Australia and Tasmania, along the eastern coasts of Asia, and in extratropical South America.

47. **C. Brownii**, *Tuckerm. Enum. Car.* 21.—Culms tufted, slender, smooth, leafy at the base, 8–16 in. high. Leaves shorter than the culms, flat, grassy, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad; margins smooth or very slightly scabrid. Spikelets 3–4; terminal one male, small, $\frac{1}{5}$ – $\frac{1}{2}$ in. long, slender, often few-flowered; remainder all female, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, about $\frac{1}{4}$ in. broad, dusky-brown, the two upper close together, on very short peduncles or subsessile, the third (when present) usually remote, on a slender erect peduncle sometimes 3 in. long; bracts leafy, rather short, but the upper exceeding the inflorescence. Male glumes narrow, membranous, terminating in a very long foliaceous awn. Female glumes with a small lanceolate or linear-oblong base ending in a serrulate awn equalling or shorter than the utricles. Utricles spreading when ripe, about $\frac{1}{5}$ in. long, broadly oblong or ovoid, turgid, obscurely trigonous, strongly nerved, dull-brown; beak very short, tipped with 2 pale-brown teeth. Styles 3. Nut obovoid-oblong, pale, trigonous.—*Boott, Ill. Car.* iv. 161, t. 532; *Benth. Fl. Austral.* vii. 447. *C. striata*, *R. Br. Prodr.* 243 (not of *Michaux*).

NORTH ISLAND: Auckland—Marshes at Lake Tongonge, near Kaitaia, *R. H. Matthews*!

An Australian plant, ranging from Queensland to Victoria; also found in Japan. Mr. Matthews, who is the first to observe it in New Zealand, considers it to be indigenous, and there is nothing improbable in its occurrence in the extreme north of the colony.

48. **C. flava**, Linn. *Sp. Plant.* 975. — Rhizome short, tufted. Culms tufted, smooth, trigonous with the angles somewhat acute, leafy, 2–8 in. high. Leaves usually longer than the culms in New Zealand specimens, yellow-green when dry, flat, $\frac{1}{5}$ – $\frac{1}{8}$ in. broad, spreading or recurved; margins slightly scabrid. Spikelets 3–8, yellow-green, closely approximate or rarely the lowest remote; terminal one (rarely two) male, slender, $\frac{1}{4}$ – $\frac{3}{4}$ in. long; remainder all female but usually with a few male flowers at the top, ovoid or roundish, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, squarrose, sessile or the lowest sometimes peduncled; bracts long, leafy, spreading. Glumes ovate, obtuse, membranous; margins pale, sometimes hyaline. Utricles much exceeding the glumes, spreading or deflexed, ovoid, trigonous, inflated, strongly ribbed, pale yellow-green, suddenly narrowed into a long slender scabrid 2-toothed beak. Styles 3. Nut obovoid, trigonous.—*Benth. Fl. Austral.* vii. 444; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 439. *C. cataractæ*, R. Br. *Prodr.* 242; *Hook. f. Fl. Tasm.* ii. 101, t. 151; *Handb. N.Z. Fl.* 315; *Boott, Ill. Car.* iv. t. 204. *C. novæ-seelandiæ*, Boeck. in *Flora* (1878), 169.

SOUTH ISLAND: Mountain districts from Nelson to Foveaux Strait. Usually from 1500 to 3500 ft., but descends to sea-level in several scattered localities. December–February.

Found also in Australia, Tasmania, and Chili in the Southern Hemisphere, and very widely distributed in the north temperate zone. New Zealand specimens have a smaller utricle than in typical *C. flava*, and the beak is shorter. They thus approach the var. *Æderi*, which is often kept as a distinct species.

49. **C. vacillans**, Sol. ex Boott in *Hook. f. Fl. Nov. Zel.* i. 285. — Culms tufted, slender, weak, triquetrous with the angles scabrid, leafy, 10–18 in. high. Leaves longer or shorter than the culms, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, flat or keeled towards the base, striate, usually with a conspicuous nerve on each side of the stout midrib; margins and midrib beneath sharply scabrid. Spikelets 4–9, 1–3 in. long, about $\frac{1}{8}$ in. broad, bright red-brown; terminal 1–3 male, sometimes mixed with a few female flowers; remainder female, usually with a few male flowers at the base, the two or three lower ones remote, nodding, on long filiform peduncles, the upper ones closer together and on shorter stalks or subsessile; bracts long, leafy. Glumes ovate-lanceolate or oblong-lanceolate, entire, gradually narrowed into a short or rather long awn, red-brown; margins paler, often lacerate. Utricles usually longer than the glumes, stipitate, fusiform, triquetrous, conspicuously costate-nerved, red-brown, narrowed into a long slender beak with 2 acute teeth. Styles 3. Nut elliptic-oblong, whitish, trigonous.—*Hook. f. Handb. N.Z. Fl.* 317; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 440. *C. spinirostris*, Col. in *Trans. N.Z. Inst.* xv. (1883) 335.

NORTH ISLAND: Not uncommon on declivities in dry woods, especially near the sea. October–November.

A very distinct species, easily recognised by the long and very slender red-brown spikelets, narrow entire glumes, and fusiform strongly ribbed long-beaked utricles.

50. **C. Cockayniana**, *Kukenthal, MS.*—Culms slender, trigonous, smooth or slightly scabrid, leafy, 1–2 ft. high. Leaves usually longer than the culms, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, flat, striate; margins scabrid above. Spikelets 5–8, $1\frac{1}{2}$ –3 in. long, about $\frac{1}{4}$ in. broad, usually remote but sometimes the upper approximate, bright red-brown or pale-brown; terminal one male, generally with female flowers at the top, which sometimes occupy quite one-half the spikelet; remainder all female, usually with male flowers at the base, all on filiform peduncles and nodding, or the upper almost sessile and erect; bracts long, leafy. Glumes ovate-lanceolate, entire or emarginate, membranous, red-brown; keel greenish, produced into a short awn. Utricles equalling the glumes or rather shorter than them, spreading when ripe, stipitate, narrow-elliptic, trigonous, strongly costate-nerved, pale yellow-brown, narrowed into a short stout minutely 2-toothed beak. Styles 3. Nut trigonous.—*C. cinnamomea*, *Cheesem. in Trans. N.Z. Inst.* xiv. (1882) 301 (*not of Olney*). *C. Forsteri*, *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 440 (*in part*).

SOUTH ISLAND: Nelson—Graham River; sources of the Takaka River, *T. F. C.*; Mount Kelvin (near Westport), *Townson*! Westland—Kelly's Hill, *Petrie*! *Cockayne*! Otago—Clinton Valley, *Petrie*! 500–4000 ft. November–January.

This differs from *C. vacillans* in the stouter habit, broader leaves, thicker spikelets, and broader and shorter utricles, which want the slender deeply bifid beak of that species.

51. **C. semi-Forsteri**, *C. B. Clarke MS. in Herb. Kew.*—Culms tufted, stout or slender, trigonous, slightly scabrid above, 1–3 ft. high. Leaves longer or shorter than the culms, broad, $\frac{1}{5}$ – $\frac{1}{3}$ in. diam. or even more, flat, striate, often with a stout nerve on each side of the midrib; margins and midrib beneath sharply scabrid. Spikelets 5–9, distant or the upper 2–3 somewhat approximate, 1–3 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, greenish or greenish-brown; terminal one male at the base with the upper half or sometimes three-quarters female; remainder all female, but usually with a few male flowers at the base, the uppermost subsessile, the rest pedunculate, the peduncle of the lowermost sometimes elongated; bracts very long and leafy. Glumes ovate-lanceolate, membranous, pale-ferruginous or whitish-green; midrib pale, produced into a short or long serrulate awn. Utricles longer or shorter than the glumes, spreading when ripe, elliptic-lanceolate, trigonous, nerved, greenish or greenish-brown; beak $\frac{1}{2}$ – $\frac{3}{4}$ as long as the utricule, with 2 linear acute teeth. Styles 3. Nut obovoid-oblong, trigonous.—*C. Forsteri*, *Boott, Ill. Car.* t. 137 (*not of Wahl.*).

KERMADEC ISLANDS: *T. F. C., Miss Shakespear!* NORTH AND SOUTH ISLANDS: Not uncommon throughout. Sea-level to 2000 ft. November-January.

I have taken up this species from notes kindly supplied to me by Mr. C. B. Clarke. It has the habit and most of the characters of *C. Forsteri*, but the terminal spikelet is invariably largely female at the top, whereas it is wholly male in *C. Forsteri*. Small states approach *C. Cockayneana*, which often has the terminal spikelet partly female; but that species has the beak of the utricle much shorter, with two very obscure teeth. Mr. Colenso's *C. sexspicata* (Trans. N.Z. Inst. xvi. (1884) 342) may be the same species, and, if so, his name must take precedence. There are no specimens in his herbarium.

52. *C. Forsteri*, Wahl. in Vet. Akad. Nya Handl. Stockh. (1803) 154.—Culms tufted, stout or rather slender, trigonous, grooved, scabrid above, leafy, $1\frac{1}{2}$ –3 ft. high. Leaves longer or shorter than the culms, broad, $\frac{1}{5}$ – $\frac{1}{3}$ in. diam., flat, harsh, striate; margins and midrib beneath sharply scabrid. Spikelets 5–10, distant, $1\frac{1}{2}$ –3 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, green or pale ferruginous; terminal 1–3 (usually 2) male, slender; remainder all female but commonly with male flowers either above or below, the upper 2–3 sessile or nearly so, the rest pedunculate, sometimes compound; bracts very long and leafy. Glumes ovate-lanceolate, membranous, ferruginous with a pale-green centre; midrib stout, produced into a short or rather long awn. Utricles equalling or exceeding the glumes, spreading when ripe, almost sessile or very shortly stipitate, elliptic-oblong or lanceolate-oblong, trigonous, nerved; beak $\frac{1}{2}$ – $\frac{2}{3}$ the length of the utricle, linear, with 2 lanceolate acute teeth. Styles 3. Nut obovoid-oblong, trigonous.—Boott in Hook. f. Fl. Nov. Zel. i. 285; Hook. f. Handb. N.Z. Fl. 315 (in part); Cheesem. in Trans. N.Z. Inst. xvi. (1884) 440. *C. recurva*, Schkuhr. Riedgr. i. 120. *C. debilis*, Forst. Prodr. n. 550. *C. punctulata*, A. Rich. Fl. Nouv. Zel. 119, t. 21.

—NORTH AND SOUTH ISLANDS: Not uncommon from the Three Kings Islands and the North Cape southwards to Foveaux Strait. Sea-level to 2000 ft. November-January.

53. *C. pseudo-cyperus*, Linn. Sp. Plant. 978.—Culms tufted, stout, triquetrous, scabrid on the angles, leafy, 1–3 ft. high. Leaves often longer than the culms, flat, broad, grassy, $\frac{1}{3}$ – $\frac{1}{2}$ in. diam.; margins scabrid. Spikelets 3–5, rarely more, usually clustered towards the top of the stem or the lowest one remote, 1–2½ in. long, pale-green; terminal one male, rarely female at the top, slender; remainder all female, long-peduncled and nodding, or in small specimens subsessile and erect, dense-flowered; bracts long, leafy. Glumes small, greenish-white, linear-oblong, suddenly narrowed into a stout serrulate awn. Utricles usually exceeding the glumes, spreading or even reflexed when ripe, stipitate, ovate-lanceolate, trigonous, somewhat inflated, strongly ribbed, greenish; beak $\frac{1}{3}$ – $\frac{1}{2}$ as long as the utricle, deeply split at the apex into two

long and narrow almost pungent teeth. Styles 3. Nut small, obovoid, trigonous.—*R. Br. Prodr.* 243; *Benth. Fl. Austral.* vii. 448; *Cheesem. in Trans. N.Z. Inst.* xvi. (1884) 441. *C. Forsteri*, *Hook. f. Handb. N.Z. Fl.* 315, *in part* (not of *Wahl.*).

Var. fascicularis.—Rather taller and stouter. Spikelets 2–4 in. long, often pale red-brown when mature, further apart and on longer peduncles, that of the lowest sometimes 4–8 in. long. Utricles broader and more truncate at the base, suddenly narrowed into a longer linear stalk; beak narrower.—*C. fascicularis*, *Boott in Hook. f. Fl. Nov. Zel.* i. 283.

NORTH AND SOUTH ISLANDS: Abundant throughout in marshes or swampy woods. Sea-level to 3000 ft. November–February.

Widely spread through the temperate regions of both hemispheres. *Mr. C. B. Clarke* is inclined to maintain the var. *fascicularis* as a distinct species.

ORDER XCII. GRAMINEÆ.

Annual or perennial, erect or creeping herbs, rarely (bamboos) shrubby or arborescent. Stem (*culm*) branched at the base, cylindrical or slightly compressed, jointed, generally hollow between the joints; joints (*nodes*) solid, swollen. Leaves alternate, distichous, usually long and narrow, entire, parallel-veined; sheath long, split to the base on one side, at its junction with the blade usually furnished with an erect membranous appendage called the *ligule*. Flowers hermaphrodite or unisexual, minute, solitary in the axils of small bracts (*glumes*) which are imbricated in 2 opposite rows, forming little spikes or *spikelets*. Spikelets usually many, arranged in spikes, panicles, or fascicles. Glumes placed alternately on each side of the axis (*rhachilla*) of the spikelet, the first or lowest 1–6 (commonly the first 2) empty and known as *empty glumes* or *outer glumes*, or simply as glumes. The succeeding 1 or several are called *flowering glumes*, each of them having in its axil a very short branchlet bearing on its upper side a 2-nerved bractlet called the *palea*; the branchlet ending in a flower, which is thus enclosed by the flowering glume and palea. Occasionally 1 or more glumes at the top of the spikelet are empty or enclose rudimentary flowers only. Perianth wanting, unless represented by 2 (rarely 3) minute scales (*lodicules*). Stamens usually 3, rarely 1, 2, or 6, hypogynous; filaments capillary; anthers pendulous, versatile, fugacious. Ovary 1-celled; styles 2 or rarely 3, free or connate at the base, feathery with simple or branched stigmatic hairs; ovule solitary, erect, anatropous. Fruit a seed-like utricle or grain (*caryopsis*) either free within the flowering glume and palea, or adhering to one or both. Seed erect, usually adherent to the membranous pericarp, rarely separable (*Sporobolus*); albumen copious, farinaceous; embryo very small, roundish, on one side of the base of the albumen.

One of the largest of the families of plants, found in all climates and situations, but most numerous in temperate regions. Genera about 325; species

probably not less than 3500. In usefulness to man it is exceeded by no other order. The nutritious herbage forms the chief pasturage of our flocks and herds; the cereal grains, as wheat, barley, rye, oats, rice, millet, maize, &c., constitute a very large proportion of our food; sugar is obtained from the sugar-cane and sorghum; while few plants are applied to a greater variety of uses than the various kinds of bamboos. Many species are cultivated for ornamental purposes, from the dwarf varieties used for edgings and lawns to the pampas-grass and giant-bamboo. Of the 33 indigenous genera, one only (*Simplicia*) is endemic; 4 (*Microlena*, *Echinopogon*, *Dichelachne*, and *Amphitromus*) are found elsewhere in Australia and Tasmania alone; and 2 others (*Ehrharta* and *Asperella*) have a very restricted range, but are not indigenous in Australia. The remaining 26 are widely distributed in either temperate or tropical regions or in both, and some are cosmopolitan. In addition to the indigenous species, a large number of grasses have become naturalised, and every year adds to the list. Most of these are natives of the Northern Hemisphere, and many have been purposely introduced and widely spread through the country on account of their value for pasturage or fodder. The remainder are either weeds of cultivation or inhabitants of waste-places or roadsides, a large proportion having followed the footsteps of civilised man all round the world. A few Australian and subtropical species have also established themselves, but the number of these is not nearly so large as might have been anticipated. Many of the naturalised species have so completely amalgamated with the indigenous flora as to present all the appearance of true natives, and will certainly be taken as such by a beginner unacquainted with their history. It will therefore be advisable, when determining any species, to make frequent reference to the list of naturalised species given in another part of this work, and to become acquainted with their distinguishing characters, which, in the majority of cases, can be learned from any British Flora.

I am deeply indebted to Professor E. Hackel, of St. Poelten, Austria, so well known for his wide acquaintance with the order, for undertaking a critical examination of the whole of the New Zealand species, and for furnishing me with very full and complete notes, with permission to use the same for the purposes of this work. In drawing up the following account I have largely availed myself of the results of his work, and with few exceptions have adopted the systematic disposition of the species recommended by him.

DIVISION A. PANICACÆ.

Spikelets articulated on their pedicels below the glumes and falling away at maturity; usually 2-flowered, the upper flower perfect and producing seed, the lower flower always male; rhachilla not continued beyond the upper flower.

TRIBE 1. ANDROPOGONEÆ.

Spikelets usually 1-flowered, generally in pairs, rarely in threes or solitary, on the rhachis of a spike or branches of a panicle, all hermaphrodite or some of them male, in the latter case so placed that a male spikelet stands by the side of a hermaphrodite one. Flowering glumes hyaline, often awned, usually much smaller than the empty ones.

Panicle long, dense, cylindrical. Spikelets awnless, almost
concealed by long silky hairs 1. IMPERATA.

TRIBE II. ZOYSIÆ.

Spikelets usually 1-flowered, solitary or in clusters on the rhachis of a spike or raceme. Flowering glumes membranous, never awned, usually smaller than the outer glumes.

Small creeping usually maritime grass. Leaves short, rigid. Spike short, stiff. Spikelets appressed to the rachis 2. ZOYSIA.

TRIBE III. PANICEÆ.

Spikelets with 1 terminal hermaphrodite flower with or without a male one below it. Flowering glumes awnless, cartilaginous or coriaceous, in fruit hardened and enclosing the grain. Outer glumes thinner in texture than the flowering glumes, rarely awned.

- Spikelets 1-flowered, plano-convex, sessile in 2 or 4 rows in one-sided spikes which are either in pairs or form the branches of a simple panicle. Empty glumes 2 .. 3. PASPALUM.
- Spikelets with 2 hermaphrodite flowers, panicle; outer glumes 2, persistent after the rest of the spikelet has fallen away 4. ISACHNE.
- Spikelets with 1 hermaphrodite flower and sometimes a male flower below; outer glumes 2 or 3, not awned, the lowest often very small 5. PANICUM.
- Stems weak, decumbent; leaves broad, ovate to lanceolate. Spikelets as in *Panicum*, but outer glumes awned .. 6. OPLISMENUS.
- Spikelets enclosed, each one or 2-3 together, in an involucre of rigid spines or bristles, often connate into a cup below 7. CENCHRUS.
- Stout wide-creeping sand-plant. Inflorescence dioecious; males in spikes clustered in heads; females in dense globular heads with long radiating pungent-pointed bracts 8. SPINIFEX.

DIVISION B. POACEÆ.

Spikelets not articulated on the pedicel below the glumes, the rachilla continuous with the pedicel, and the articulations above the outer glumes and frequently also between the flowering glumes. Flowers 1 to many, the lowest flower perfect, the uppermost often male or imperfect. (Lower flower imperfect in *Phalarideæ*.)

TRIBE IV. PHALARIDEÆ.

Spikelets with 1 terminal hermaphrodite flower, with or without 1 or 2 male or rudimentary flowers below. Outer glumes 4, the lower 2 sometimes small, the 2 inner sometimes serving as flowering glumes for male flowers.

- First and second outer glumes smaller than the third and fourth. Flowering glumes obtuse 9. EHRHARTA.
- First and second outer glumes minute, many times smaller than the third and fourth. Flowering glumes acute .. 10. MICROLÆNA.
- First and second outer glumes as large as the third and fourth, both of which usually contain a male flower .. 11. HIEROCHLÆ.

TRIBE V. AGROSTIDEÆ.

Spikelets 1-flowered; rachilla frequently produced beyond the flower. Outer glumes 2, usually as long or longer than the flowering glume.

- Spikelets panicle. Outer glumes usually longer than the flowering, which are rigid and convolute and awned. Awn long, terminal, bent, usually twisted below the bend .. 12. STIPA.
- Panicle short and dense, cylindrical, bristly from the long awns. Flowering glume hyaline, 3-fid, middle lobe produced into a long awn. Rachilla evidently produced.. 13. ECHINOPOGON.

- Panicle dense, cylindrical. Outer glumes compressed, fringed on the keel. Flowering glume hyaline, with a short dorsal awn. Rhachilla not produced .. 14. *ALOPECURUS*.
- Panicle long, narrow and spike-like in the New Zealand species. Spikelets small, awnless. Flowering glume usually exceeding the outer glumes. Seed loose in the pericarp and finally expelled from it .. 15. *SPOROBOLUS*.
- Spikelets panicled. Outer glumes very minute. Flowering glume awnless, acuminate, pubescent. Palea almost as long as the glume .. 16. *SIMPLICIA*.
- Spikelets small, panicled. Flowering glume hyaline, much smaller than the outer glumes, awned on the back or awnless. Palea usually short, often minute or wanting. Rhachilla not produced .. 17. *AGROSTIS*.
- Spikelets small, panicled. Flowering glume hyaline, smaller than the outer glumes or almost equalling them, awned on the back. Palea more than half as long as the flowering glume. Rhachilla produced beyond the palea, silky .. 18. *DEYEUXIA*.
- Panicle long, narrow, dense, bristly from the long awns. Flowering glume hardly shorter than the outer glumes, with a long and fine awn from the back near the tip .. 19. *DICHELACHNE*.

TRIBE VI. AVENÆ.

Spikelets 2- or several-flowered, usually panicled. Flowering glumes generally shorter than the outer glumes, usually awned; awn geniculate and often twisted, rarely straight.

* Awn of the flowering glumes dorsal, rising from below the terminal teeth of the glume, not from between them.

- Spikelets 2-flowered. Flowering glumes erose or 2-toothed at the tip, shortly awned .. 20. *DESCHAMPSIA*.
- Spikelets 2-6-flowered. Flowering glumes sharply 2-toothed at the tip; teeth sometimes almost awned; awn from the back just below the teeth .. 21. *TRisetum*.
- Spikelets 5-10-flowered. Flowering glumes rounded at the back; awn dorsal, straight or bent .. 22. *AMPHIBROMUS*.

** Awn of the flowering glumes rising from between the terminal lobes or teeth of the glume.

- Spikelets several-flowered. Flowering glumes rounded at the back, often ciliate or hairy; awn rigid, often twisted or flattened at the base .. 23. *DANTHONIA*.

TRIBE VII. CHLORIDEÆ.

Spikelets 1-many-flowered, crowded in two rows on one side of a flat rhachis or spike; spikes in racemes or digitate.

- Spikes digitate or scattered at the top of the culm. Spikelets compressed, several-flowered, awnless. Outer glumes persistent; flowering glumes deciduous .. 24. *ELEUSINE*.

TRIBE VIII. FESTUCEÆ.

Spikelets 2-many-flowered, usually panicled or racemed. Flowering glumes generally exceeding the outer glumes, awnless or with 1 or several straight awns, which are usually terminal, rarely dorsal. Rhachilla produced beyond the uppermost flower.

- Tall reed-like grasses with silvery panicles. Flowering glumes covered with long hairs, membranous. Rhachilla long, glabrous 25. *ARUNDO*.
- Spikelets 3-5 flowered, usually rounded on the back. Flowering glumes 2-3-toothed, middle tooth often mucroniform or slightly awned 26. *TRIODIA*.
- Panicle spiciform. Spikelets 2-5-flowered, shining, compressed. Flowering glumes scarious, mucronate or shortly awned 27. *KÆLERIA*.
- Spikelets 2-many-flowered, compressed. Flowering glumes keeled at the back, acute or obtuse, awnless, often (together with the rhachilla) clothed at the base with tangled hairs. Hilum punctiform 28. *POA*.
- Spikelets 3-many-flowered. Flowering glumes rounded at the back, obtuse, awnless, 5-9-nerved. Lodicules distinct. Hilum punctiform 29. *ATROPIS*.
- Spikelets 2-many-flowered. Flowering glumes rounded on the back, more rigid than in *Poa*, acute or awned. Ovary naked or hairy. Hilum long, linear 30. *FESTUCA*.
- Spikelets 3-many-flowered. Flowering glumes rounded on the back or slightly keeled, mucronate or awned, 5-9-nerved. Ovary villous at the top 31. *BROMUS*.

TRIBE IX. HORDEÆ.

- Spikelets 1-many-flowered, sessile in alternate notches on opposite sides of the rhachis of a simple spike, either solitary or several together. Glumes awned or not.

- Spikelets solitary in the notches of the rhachis, 2-many-flowered, placed flatwise on the rhachis. Outer glumes conspicuous 32. *AGROPYRUM*.
- Spikelets solitary (or in non-New-Zealand species in pairs) at the notches of the rhachis, 2-4-flowered, placed flatwise on the rhachis. Empty glumes either wanting or reduced to 2 small bristles 33. *ASPERELLA*.

1. *IMPERATA*, Cyr.

Tall erect perennial grasses. Leaves long. Panicles long, terminal, densely spiciform or narrow-thyriform, silky-silvery. Spikelets all similar, numerous, densely clothed with long silky hairs, usually arranged in pairs on the continuous branches of the panicle, one sessile or almost so, the other distinctly stalked, all 1-flowered. Empty glumes 3, subequal, narrow, membranous, awnless, 3-9-nerved, the 2 outer clothed with long hairs. Flowering glume usually much smaller, hyaline. Palea small, broad, hyaline, nerveless. Lodicules wanting. Stamens 1 or 2. Stigma long, exserted from the tip of the spikelet. Grain oblong, with an embryo half its length or more.

A genus of about 6 species, found in the tropical or warm temperate regions of both hemispheres. One of the New Zealand species is very widely diffused, the other is endemic in the Kermadec Islands.

- Panicle densely spiciform, cylindric, obtuse, shining.
Stamens 2 1. *I. arundinacea*.
- Panicle not so dense, narrow-lanceolate, acuminate, not shining. Stamen 1 2. *I. Cheesemanii*.

1. **I. arundinacea**, *Cyr. Pl. Bar. Ic.* ii. 26, t. 11; var. **Kœnigii**, *Benth. Fl. Hongk.* 419. — Culms 1–3 ft. high, slender, erect, glabrous, 3–4-noded. Leaves erect, narrow, often exceeding the culms; sheaths rather loose, with a dense erect tuft of hairs at the nodes; ligules short, membranous, truncate; laminæ linear from a very narrow base, acuminate, rather rigid, flat or convolute; margins scabrid; midrib stout. Panicle densely spiciform, 3–6 in. long, cylindric, obtuse, silvery-white and shining from the long and silky hairs which conceal the glumes; branchlets very numerous, appressed; pedicels capillary or setaceous, clavate at the apex. Spikelets about $\frac{1}{6}$ in. long, completely enveloped by fine silky hairs $\frac{1}{3}$ in. long. Empty glumes ovate-lanceolate, obtuse or subacute, hyaline, 5–7-nerved or the uppermost nerveless. Flowering glume $\frac{1}{3}$ – $\frac{1}{2}$ as long as the upper empty glume, ovate, acute, glabrous, hyaline, nerveless. Palea about $\frac{1}{2}$ as long as the glume, quadrate, truncate, nerveless. Stamens 2. Stigmas long, purple.—*Hack. in D.C. Monog. Phan.* vi. 94; *Stapf. Fl. Capen.* vii. 321.

NORTH ISLAND: Auckland—Near Kaitaia, *R. H. Matthews!*

Perhaps introduced only, but it is one of those species which might be expected to be indigenous in the extreme north of the colony, and I have consequently given it the benefit of the doubt. The species, in some of its forms, is found in all warm countries; var. *Kœnigii* is common throughout Africa, and in Australia and Tasmania, stretching northwards to India, China, and Japan.

2. **I. Cheesemanii**, *Hack. in Trans. N.Z. Inst.* xxxv. (1903) 378.—Perennial, innovation-shoots extravaginal. Culms 1–3 ft. high, simple, stout, erect, glabrous, 3-noded. Leaves numerous, rather shorter than the culms; sheaths loose, bearded at the mouth but otherwise glabrous, the uppermost sheathing the base of the panicle, the lowest scale-like; ligules short, truncate, membranous; laminæ linear from a narrow base, acute or acuminate, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, flat, nerved, glabrous; margins scabrid above. Panicle narrow-lanceolate, gradually narrowed upwards into an acute point, 5–10 in. long, $\frac{3}{4}$ – $1\frac{1}{4}$ in. broad, dense but not so much so as in *I. arundinacea*, greyish-white with long soft hairs that conceal the glumes, not shining; branches numerous, erecto-patent, flexuose, simple or with short branchlets in the lower half, pedicels clavate above. Spikelets about $\frac{1}{5}$ in. long, enveloped by long soft hairs $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Outer glume as long as the spikelet, lanceolate, subacute, membranous, obscurely 5-nerved, laxly pilose along the back, ciliolate at the apex; the 2nd similar but 3-nerved; 3rd $\frac{1}{3}$ shorter, broadly ovate, obtuse, hyaline, nerveless. Flowering glume $\frac{1}{3}$ shorter than the outer empty glumes, ovate, acuminate, tridentate, hyaline, nerveless. Palea broad, truncate, fimbriate-ciliate. Stamen 1. Stigmas long, purple.—*I. arundinacea*, *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 175 (*not of Cyr.*).

KERMADEC ISLANDS: Cliffs on the north side of Sunday Island, a abundant.
T. F. C., Miss Shakespear!

Closely allied to *I. exaltata*, Brong., but a much smaller plant, with a smaller and less branched panicle, larger and broader spikelets on more clavate pedicels, and with the outer glume 5-nerved.

2. ZOYSIA, Willd.

Small perennial creeping grasses. Culms branched at the base, rigid, erect. Leaves distichous, subulate, often pungent-pointed. Spikelets few, ovoid, 1-flowered, sessile or shortly pedicelled, not distichous, jointed on and closely appressed along a rigid notched unjointed rhachis, forming a short spike. Glumes 2; the outer one empty, broad, convolute, coriaceous, shining and nerveless; the inner flowering one included within the outer and much smaller than it, membranous, hyaline. Palea still smaller, short, nerveless, hyaline, sometimes wanting. Lodicules wanting. Stamens 3. Styles long, distinct; stigmas elongate. Grain free, enclosed within the hardened outer glume.

A small genus of 2 or 3 closely related species, found on the shores of southern and eastern Asia, Mauritius, Australia, and New Zealand.

1. *Z. pungens*, Willd. in *Ges. Naturf. Fr. Neue Schr.* iii. (1801) 441.—Rhizome long, creeping, branched, rigid and wiry. Culms numerous from the rhizome, often branched at the base, erect, rigid, glabrous, usually from 1 to 3 in. high, but sometimes taller and attaining 4–6 in. or even more. Leaves more or less spreading, subulate, flat or convolute, coriaceous; sheaths short, grooved, tipped with a few cilia; ligule wanting. Spike terminal, $\frac{1}{8}$ – $\frac{3}{4}$ in. long; spikelets usually 3–5, but in small specimens often reduced to one, and in large ones sometimes as many as 7–9. Outer glume smooth and shining, convolute, coriaceous, tip often produced into a short awn. Flowering glume thin and hyaline, included within the outer glume.—*Hook. f. Fl. Nov. Zel.* i. 312; *Handb. N.Z. Fl.* 324; *Benth. Fl. Austral.* vii. 506; *Buch. N.Z. Grasses*, t. 13A. *Rottboella uniflora*, A. Cunn. *Precur.* n. 267; *Raoul, Choix*, 39.

NORTH AND SOUTH ISLANDS: Abundant on sandy shores from the North Cape to Banks Peninsula and Okarito, less common in dry places inland, ascending to 2000 ft. at Lake Taupo and in Canterbury and Otago. Also not uncommon on the shores of Australia and Tasmania, extending northwards to India, Malacca, and China.

3. PASPALUM, Linn.

Annual or perennial grasses, of various habit. Spikelets 1-flowered, orbicular or oblong, obtuse or rarely acute, not awned, sessile or very shortly pedicelled, arranged in one or two rows on one side of a slender spike; spikes solitary, binate, digitate, or paniced. Glumes 3; 2 outer empty, membranous, usually subequal or rarely

the lowest smaller or absent; upper or flowering glume much firmer, cartilaginous or almost coriaceous, 5-7-nerved. Palea similar in texture to the flowering glume but rather smaller, 2-nerved. Lodicules 2, cuneate. Stamens 3. Styles 2, distinct to the base, rather long. Grain ovoid or oblong, free, enclosed within the hardened flowering-glume and palea.

Species about 160, scattered through the tropics of both hemispheres, but most abundant in America. The three species found in New Zealand are widely distributed.

Rhizome not creeping. Culms usually erect, 1-3 ft.

Spikelets orbicular-ovoid, obtuse 1. *P. scrobiculatum*.

Rhizome long, creeping. Culms ascending, 6-24 in.

Leaves flat, $\frac{1}{8}$ - $\frac{1}{3}$ in. broad. Lateral spikes sessile.

Spikelets oblong-ovoid, acute 2. *P. Digitaria*.

Rhizome long, creeping. Culms ascending, 2-8 in.

Leaves involute, $\frac{1}{12}$ in. broad. Spikes all peduncled.

Spikelets oblong, acute 3. *P. distichum*.

1. *P. scrobiculatum*, Linn. *Mant.* i. 29.—Rhizome short. Culms tufted, erect or decumbent at the base, usually sheathed throughout by the leaves, glabrous, 1-3 ft. high. Leaves linear or linear-lanceolate, acute or acuminate, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, glabrous or slightly hairy towards the base, flat or wrinkled; margins rough; ligule short, broad, membranous; sheaths rather lax. Spikes varying in number from 2 to 6, 1-2 in. long, alternate towards the top of the culm, usually rather distant, spreading or erect; rhachis $\frac{1}{12}$ in. broad, flat, margins ciliate. Spikelets in 2 or rarely 3-4 rows, imbricate, sessile or very shortly pedicelled, sometimes geminate on a common pedicel, ovoid-orbicular, obtuse, glabrous. Empty glumes subequal, thin and membranous, with a prominent midrib; the outer one with a single marginal vein on each side; the upper one with 2 marginal veins. Flowering glume similar in size and shape to the empty glumes, hard and coriaceous, brown, shining, minutely pitted. Palea coriaceous like the flowering glume, the margins produced into membranous inflexed auricles.—*Hook. f. Fl. Nov. Zel.* i. 291; *Handb. N.Z. Fl.* 323; *Benth. Fl. Austral.* vii. 460; *Buch. N.Z. Grasses*, t. 10A. *P. orbiculare*, *Forst. Prodr.* n. 35; *A. Rich. Fl. Nouv. Zel.* 140; *A. Cunn. Precur.* n. 266; *Raoul, Choix*, 39.

NORTH ISLAND: Auckland—Lowland stations from the North Cape to the East Cape, not uncommon.

An abundant plant in all warm countries outside America.

2. *P. Digitaria*, Poir. *Encycl. Suppl.* iv. 316.—Rhizome long, branched, creeping and rooting. Culms erect or ascending, sheathed throughout by the leaves, glabrous, 6-24 in. high. Leaves numerous, distichous, 2-8 in. long, $\frac{1}{8}$ - $\frac{1}{3}$ in. broad, flat, glabrous or sparingly hairy towards the base; ligules short, membranous, truncate; sheaths compressed, striate, margins pilose above. Spikes rather

slender, 1-2 in. long, usually 2 but sometimes 3 or even 4, the lateral ones sessile or nearly so; rhachis flat, margins scabrid. Spikelets in 2 rows, nearly sessile, imbricate and appressed to the rhachis, ovate-oblong, acute, flattened, pale-green. Empty glumes equal, acute, membranous, pubescent or glabrous; the lower one 3-nerved; the upper 5-nerved, sometimes an additional minute empty glume is present at the base of the spikelet. Flowering glume coriaceous, smooth, shining, faintly nerved. Palea smaller, coriaceous, margins inflexed but not auricled.—*Stapf. in Fl. Capen. vii. 370.*

NORTH ISLAND: Auckland—Near Ahipara, *T. F. C.*; Bay of Islands and Whangarei, *Petrie!* marshes by the lower Waikato, *T. F. C.*; Coromandel, *Petrie!*

Probably introduced into New Zealand, as in Australia, South Africa, India, and other countries, but the localities it affects give it the appearance of being indigenous. It is a common plant in many parts of America, from Virginia southwards. It can be distinguished from *P. distichum* by its greater size, much broader flat leaves, and by the lateral spikes being sessile.

3. *P. distichum*, *Linn. Amœn. Acad. v. 391.*—Rhizome long, branched, creeping and rooting. Culms numerous, ascending, sheathed throughout by the leaves, glabrous, 2-8 in. high. Leaves numerous, distichous, 2-5 in. long by about $\frac{1}{2}$ in. broad, linear, acute, strict, spreading, usually involute; ligules short, truncate; sheaths thin, pale, loose, bearded at the mouth. Spikes 2, both peduncled and jointed on the top of the culm, usually spreading, 1-1½ in. long; rhachis narrower than the spikelets. Spikelets in two rows, sessile or nearly so, imbricate and appressed to the rhachis, oblong, acute or almost acuminate, flattened, glabrous, pale. Empty glumes equal, acute, thin and membranous, faintly 3-5-nerved. Flowering glume rather shorter than the empty glumes, coriaceous, pale, very indistinctly nerved. Palea coriaceous like the flowering glume, margins slightly auricled.—*Hook. f. Fl. Nov. Zel. i. 291; Handb. N.Z. Fl. 323; Benth. Fl. Austral. vii. 460; Buch. N.Z. Grasses, t. 10B.*

NORTH ISLAND: Auckland—Salt marshes from the North Cape to the Bay of Plenty and the Waikato River, abundant.

Widely distributed in all warm countries.

4. *ISACHNE*, R. Br.

Perennial or rarely annual grasses. Culms tufted, or decumbent or creeping at the base. Spikelets small or minute, loosely paniced, not at all or very obscurely articulate on the pedicels, 2-flowered; both flowers hermaphrodite, or the lower flower sometimes male, and the upper flower sometimes female. Empty glumes 2, subequal, persistent or separately deciduous, convex, membranous, awnless. Flowering glumes 2, rather smaller than

the empty glumes, equal or the lower larger, convex or almost hemispherical, subcoriaceous. Palea as long as the flowering glume. Lodicules very minute. Stamens 3, rarely more. Grain free within the hardened glume and palea, generally falling away with them.

Species about 20, widely spread in most tropical or subtropical regions. The single New Zealand species ranges through Australia to India and China.

1. **I. australis**, R. Br. *Prodr.* 196.—Culms slender, creeping or decumbent at the base, ascending above, glabrous or nearly so, 6–18 in. high. Leaves short, 2–6 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, lanceolate or linear-lanceolate, acute, flat, minutely rough on both surfaces, margins scaberulous; sheaths smooth, ciliate at the mouth and on the margins above. Panicle erect, usually open, ovoid or pyramidal in outline, 2–4 in. long; branches numerous, sparingly divided, very slender, flexuose, minutely scaberulous. Spikelets all pedicelled, small, globose or nearly so, obtuse, about $\frac{1}{12}$ in. long. Empty glumes membranous, glabrous, many-nerved. Flowering glumes firm and coriaceous, unequal in size; the lower much the larger, smooth, shining; upper sometimes minutely pubescent. Lower flower usually male; upper female. Palea coriaceous like the flowering glume.—*Hook. f. Fl. Nov. Zel.* i. 291; *Handb. N.Z. Fl.* 324; *Benth. Fl. Austral.* vii. 625; *Buch. N.Z. Grasses*, t. 12.

NORTH ISLAND: Abundant in swamps from the North Cape to the East Cape, Lake Taupo, and Taranaki. Sea-level to 1800 ft.

Greedily eaten by cattle. In summer and autumn it often affords a large amount of nutritious pasturage in swampy districts.

5. PANICUM, Linn.

Annual or perennial grasses, of very various habit. Spikelets lanceolate to ovate or broadly oblong, rarely globose, acuminate or acute or obtuse, articulate on the pedicel, laxly or densely paniculate, or very shortly pedicelled along one side of slender simple or branched spikes, seldom awned, glabrous or pubescent, never with bristles or spines at the base, with a single terminal hermaphrodite flower, sometimes with a male one below it. Glumes 4; the lowermost small, sometimes minute, empty; the 2nd and 3rd unequal or subequal, membranous, awnless or rarely awned, empty or the 3rd containing a male or rudimentary flower; 4th or flowering glume shorter or as long as the 3rd, firmer and more coriaceous, hardening in fruit. Palea like the flowering glume but smaller, 2-nerved. Lodicules 2. Grain enclosed in the hardened flowering glume and palea, oblong or ellipsoid; hilum punctiform.

As characterized above, this is a heterogeneous assemblage of about 300 species, found in all warm climates, but rare or absent in temperate countries.

The single New Zealand species belongs to the section *Digitaria*, often kept as a distinct genus, in which the spikelets are almost sessile on one side of simple digitate spikes.

1. *P. sanguinale*, Linn. *Sp. Plant.* 57.—Annual. Culms creeping or rooting at the base, then spreading or erect, 6–18 in. long. Leaves 1–6 in. long by $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, flat, flaccid, pubescent or glabrous; sheaths thin, rather loose, often pilose and bearded at the nodes; ligules truncate, membranous. Spikes few or many, usually 3–6, varying in length from 1 to 4 in., crowded at the end of the culm, strict, spreading or erect; rhachis triquetrous or flattened. margins scaberulous. Spikelets geminate, one sessile, the other pedicelled, oblong-lanceolate, acute, greenish or purplish, $\frac{1}{15}$ – $\frac{1}{12}$ in. long. Outer glume very minute, ovate, acute; 2nd small, ovate-lanceolate, 3-nerved, about $\frac{1}{2}$ the length of the flowering glume; 3rd rather longer than the flowering glume, oblong, acute, 6–7-nerved, the nerves often ciliate; 4th or flowering glume oblong, firm and subcoriaceous, acute or acuminate.—*Benth. Fl. Austral.* vii. 469; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 175.

KERMADEC ISLANDS: Not uncommon in shady places. NORTH AND SOUTH ISLANDS: Abundant as a naturalised weed.

The Kermadec Islands plant, which is the only one which can be considered as indigenous, is referred by Hackel to the variety *microbachne* (*Panicum microbachne*, Presl.), and is a much more delicate and slender plant than the type, which is now plentiful as a naturalised weed in cultivated ground in most parts of New Zealand, as in all warm countries.

6. OPLISMENUS, Beauv.

Weak, delicate grasses. Culms decumbent and often rooting at the base, branched, ascending above, leafy. Leaves thin, flat, broad, ovate to lanceolate. Spikelets 1-flowered, jointed on the pedicel, in little clusters on the branches of a simple panicle or spike. Glumes 4, the 3 outer membranous, empty or the 3rd with a rudimentary palea; the outer short, 3-nerved, with a long straight rigid awn; 2nd rather longer, awn short or almost wanting; 3rd the largest, 5-nerved, usually awnless; 4th or flowering glume rather shorter than the 3rd, lanceolate, firm, smooth, awnless, hardened in fruit. Palea coriaceous like the flowering glume. Stamens 3. Styles distinct. Grain oblong, enclosed within the hardened flowering glume and palea.

Species probably not more than 4 or 5, widely distributed in the warm regions of both hemispheres.

1. *O. undulatifolius*, Beauv. *Agrost.* 54.—Culms prostrate and rooting at the base, ascending above, slender, weak, sparingly branched, 6–18 in. long. Leaves 1–3 in. long by $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, rarely more, lanceolate, acuminate, flat, glabrous or sparsely pilose; sheaths and nodes more or less pilose. Spike slender, 2–4 in. long;

rhachis glabrous or pilose with spreading hairs. Spikelets small, $\frac{1}{12}$ – $\frac{1}{8}$ in. long, in distant sessile clusters of 2–6 or the uppermost solitary, sometimes the lower clusters are produced into a short spike-like branch. Empty glumes 3, concave, membranous, nerved, pilose, the lower one with a stout rigid awn $\frac{1}{5}$ – $\frac{1}{2}$ in. long. Flowering glume pale, coriaceous, nerveless, shining.—*O. setarius*, *Roem. and Schult. Syst.* ii. 481; *Benth. Fl. Austral.* vii. 492. *O. æmulus*, *Kunth, Rev. Gram.* i. 44; *Hook. f. Fl. Nov. Zel.* i. 292. *Orthopogon æmulus*, *R. Br. Prodr.* 194. *Panicum imbecille*, *Trin. Sp. Gram. Ic.* ii. t. 191; *Hook. f. Handb. N.Z. Fl.* 323. *Hekaterosachne elatior*, *Steud. Syn. Pl. Gram.* 118.

KERMADEC ISLANDS, NORTH ISLAND: Abundant throughout in shaded low-land stations. SOUTH ISLAND: Recorded from Nelson (*Travers*) and Canterbury (*Lyall*), but I have seen no specimens.

An abundant plant in all warm climates, and barely distinct from the widely diffused *O. compositus*, Beauv.

7. CENCHRUS, Linn.

Annual or perennial grasses, usually tall. Leaves flat, flaccid. Spikelets narrow, with a single terminal hermaphrodite flower with or without a male flower below it, enclosed 1–4 together in an ovoid or globose involucre of numerous bristles or spines, the inner of which are broad and flattened, connate at the base and hardened in fruit; the involucres sessile in a terminal spike or raceme, and deciduous with the spikelets. Glumes 4; the outer much the smallest, sometimes minute, empty; 2nd equalling the 3rd or a little shorter, empty; 3rd usually containing a palea and sometimes 3 stamens; 4th or flowering glume rather shorter than the 3rd and more rigid. Stamens 3. Styles often connate at the base. Grain enclosed in the flowering glume and palea, free from them.

Species about 12, in the warm regions of both hemispheres and in temperate North America.

1. *C. calyculatus*, *Cav. Ic.* v. 39, t. 463.—Culms tufted, tall, stout, glabrous, 2–4 ft. high or more. Leaves long, linear-lanceolate, acuminate, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, flat, glabrous, scaberulous on the margins and veins above; sheaths long, rather lax; ligule split into numerous fine erect bristles. Spike 5–10 in. long by $\frac{1}{2}$ in. broad, stout, dense; rhachis angular, pubescent. Involucres about $\frac{1}{3}$ in. long, sessile or very shortly pedicelled, spreading or at length deflexed, broadly ovoid; inner bristles 8–12, connate at the base, compressed, unequal in length, sometimes one much longer than the rest, lower $\frac{2}{3}$ plumose with soft spreading hairs, upper $\frac{1}{3}$ rough and scabrous; outer bristles numerous, much shorter, spreading, subulate, scabrous throughout. Spikelets 1 or 2 within the involucres; outer empty glume half the length of the 2nd, ovate, acute, 1-nerved; 2nd

rather shorter and broader than the 3rd, 3-nerved; 3rd with a palea and male flower, 5-7-nerved; 4th or flowering glume rather shorter and narrower, firmer in texture.—*Cheesem in Trans. N.Z. Inst.* xx. (1888) 175. *C. anomoplexis*, *Lab. Sert. Austr. Caled.* 14, t. 19.

KERMADEC ISLANDS: Sandy soil on the north side of Sunday Island, not common, *T. F. C.* Also a native of New Caledonia and others of the Pacific islands.

8. **SPINIFEX**, Linn.

Usually wide-creeping hard and stout branching grasses. Leaves long, involute, silky. Inflorescence diœcious. Male spikelets 2-flowered, sessile or shortly pedicelled, articulate on long erect spikes which are arranged in umbels surrounded by leafy spathaceous bracts. Glumes 4, all membranous, awnless; 2 lowest empty; 3rd and 4th each with a palea and 3 stamens. Female spikelets 1- or rarely 2-flowered, numerous, each one solitary at the base of long rigid pungent stellately spreading spines, surrounded by short lanceolate bracts, the whole inflorescence forming a large globose head. Glumes 4, subequal, narrow; 2 lowest empty; 3rd with a palea and sometimes with a rudimentary male flower; 4th with a female flower. Lodicules 2, large. Styles long, free; stigmas plumose. Grain free within the hardened flowering glume and palea.

A small genus of 4 species, 3 of which are found in Australia, one of them extending to New Zealand and New Caledonia, the fourth stretching from Ceylon and India to Java, China, and Japan.

1. ***S. hirsutus***, *Labill. Pl. Nov. Holl.* ii. 81, t. 230, 231.—Stems creeping and rooting, branched, often many feet long, stout, knotted, silky or woolly. Leaves 1-2 ft. long, coriaceous, flexuous, densely clothed with soft silky hairs, margins strongly involute; sheaths long, broad, the inner smooth and shining; ligules split into a dense brush of erect silky hairs. Male spikes numerous, 2-4 in. long, arranged in a terminal umbel, with or without a cluster of 2-3 placed lower down the culm. Spikelets about $\frac{1}{3}$ in. long. Glumes silky, 5-7-nerved. Female heads large, globose, 6-12 in. diam.; spines very numerous, spreading all round, slender, subulate, pungent-pointed. Spikelets very narrow, acute or acuminate, $\frac{1}{2}$ in. long. Glumes 7-9-nerved.—*Hook. f. Fl. Nov. Zel.* i. 292; *Handb. N.Z. Fl.* 322; *Benth. Fl. Austral.* vii. 503; *Buch. N.Z. Grasses*, t. 8, 9. *S. sericeus*, *R. Br. Prodr.* 198; *A. Rich. Fl. Nouv. Zel.* 122; *A. Cunn. Precur.* n. 268; *Raoul, Choix*, 40. *Ixalum inerme*, *Forst. Prodr.* n. 564.

NORTH ISLAND: Abundant on sandhills near the sea. SOUTH ISLAND: Nelson—Sandy shores of Blind Bay, *T. F. C.*; Cape Farewell, *H. H. Travers*. Canterbury—*Travers, Armstrong*.

Also common in Australia and New Caledonia. It is a valuable plant for fixing the surface of moving sand-dunes.

9. EHRHARTA, Thunb.

Perennial or annual grasses, of very varied habit. Leaves flat or convolute. Spikelets laterally compressed, 1-flowered, pedicellate, arranged in a panicle or simple raceme; rhachilla disarticulating above the 2 lowest glumes, obscurely produced above the flower. Glumes 5; the 2 lowest short, empty; 3rd and 4th longer, awned, frequently hairy at the base, also empty, 4th the longest, often with a callus at its base; 5th or flowering glume shorter, thinner, never awned, usually with a callus or tuft of hairs at its base. Palea narrow, keeled, finely and closely 2-nerved. Stamens 6 in the great majority of the species, 2 only in the New Zealand ones. Styles short or rather long; stigmas plumose. Grain ovoid or elliptic, compressed, enclosed within the flowering glume and palea, but free from them.

A genus of 27 species, all but the two following natives of South Africa, one of them extending northwards to eastern tropical Africa and Arabia.

Culms 6-18 in. Panicle 2-4 in., many-spiculate.	Two	
lowest empty glumes acute .. ..	..	1. <i>E. Colensoi</i> .
Culms 1-5 in. Raceme small, of 2-5 spikelets.	Two	
lowest empty glumes broad, obtuse .. ..	..	2. <i>E. Thomsoni</i> .

1. *E. Colensoi*, Hook. f. *Fl. Nov. Zel.* i. 288, t. 65A.—Culms numerous, tufted, branched at the base, glabrous, many-noded, 6-18 in. high. Leaves numerous, distichous, suberect, the upper ones 4-6 in. long by $\frac{1}{8}$ – $\frac{1}{5}$ in. broad, flat, faintly nerved, glabrous, tapering from the base to a slender point, the lowermost with the blades much reduced in size and almost scale-like; ligules very short, jagged; sheaths short, close, firm, thin, striate, glabrous. Panicles contracted, inclined or drooping, $1\frac{1}{2}$ –4 in. long; rhachis slender, smooth; branches short, suberect, in small specimens sometimes reduced to single spikelets. Spikelets compressed, linear-oblong, about $\frac{1}{4}$ in. long; pedicels short, slender. Two lowest glumes about half the length of the 3rd and 4th respectively, acuminate, 3-5-nerved; 3rd and 4th narrower, awned, silky-hairy at the base, 5-7-nerved. Flowering glume shorter than the 4th and about equal to the 3rd, oblong, obtuse, glabrous. Palea linear; rhachilla produced behind it as a minute appendage.—*Handb. N.Z. Fl.* 319; *Buch. N.Z. Grasses*, t. 1.

NORTH ISLAND: Ruahine Mountains, *Colenso!* *H. Hill!* *Petrie!* Mount Egmont, *T. F. C.*; Tararua Mountains, *H. H. Travers!* SOUTH ISLAND: Nelson—Mount Arthur, Mount Owen, *T. F. C.*; Mount Rochfort, Mount Faraday, *Townson!* Canterbury and Westland—Mountains above Arthur's Pass, *T. F. C.*; Kelly's Hill, *Petrie!* Otago—Clinton Saddle, Lake Te Anau, *Petrie!* 3000-5500 ft.

2. **E. Thomsoni**, *Petrie in Trans. N.Z. Inst.* xii. (1880) 356, t. 10.—A small densely tufted species. Culms short, stout, much branched, spreading, quite glabrous, 1–5 in. high. Leaves numerous, distichous, spreading, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad, lanceolate, acute, strongly nerved; ligule reduced to a mere line; sheaths pale, strongly grooved. Inflorescence reduced to a short stout erect raceme of 2–5 spikelets, sometimes hardly longer than the leaves; pedicels short, stout, often appressed to the rhachis. Spikelets $\frac{1}{6}$ – $\frac{1}{5}$ in. long, compressed. Two outer glumes small, subequal, broadly oblong or rounded, obtuse, less than $\frac{1}{3}$ as long as the 3rd and 4th respectively; 3rd and 4th ovate-lanceolate, rigid, keeled, awned, 5-nerved, silky at the base, keel and awns minutely scabrid. Flowering glume shorter, oblong, obtuse or subacute, 3–5-nerved. Palea linear. Stamens 1–2.

SOUTH ISLAND: Nelson—Mount Rochfort, *Dr. Gaze! Townson!* Otago—Longwood Range, *Kirk!* STEWART ISLAND—Port Pegasus, *Thomson and Petrie! Kirk!* Rakiwha, *P. Goyen!* AUCKLAND ISLANDS—*F. R. Chapman!* Sea-level to 4000 ft.

A very curious and distinct little species.

10. MICROLÆNA, R. Br.

Slender perennial grasses; culms simple or branched. Leaves flat or convolute when dry. Spikelets laterally compressed, 1-flowered, pedicellate, arranged in a narrow lax panicle; rhachilla disarticulating above the 2 outer glumes. Glumes 5; the 2 outer very small, persistent; 3rd and 4th long, narrow, produced into long awns, the 4th much the longest; 5th or flowering glume shorter, acute, not awned. Palea linear. Lodicules 2, rather large, thin. Stamens 4 or 2. Styles distinct; stigmas plumose. Grain enclosed within the flowering glume and palea but free from them.

A small genus of 5 species, confined to Australia and New Zealand. One of the New Zealand species is also found in Australia, the remaining two are endemic.

* The two outer glumes distant from the 3rd and 4th.

Leaves flat, thin, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad. Panicle 3–9 in., narrow.

Stamens 4 1. *M. stipoides*.

** The 2 outer glumes not distant from the 3rd and 4th.

Culms not branched. Leaves broad, $\frac{1}{4}$ – $\frac{1}{2}$ in. Panicles 1–2 ft., compound. Stamens 2 2. *M. avenacea*.

Culms branched. Leaves $\frac{1}{10}$ – $\frac{1}{8}$ in. broad. Panicle reduced to a simple raceme 1–3 in. long, rarely branched at the base. Stamens 4 3. *M. polynoda*.

1. **M. stipoides**, *R. Br. Prodr.* 210.—Rhizome creeping and rooting, branched. Culms numerous from the rhizome, often branched below, erect or ascending, slender, glabrous, 1–2 ft. high or more.

Leaves rather short, 3-9 in. long, $\frac{1}{8}$ - $\frac{1}{5}$ in. broad, thin, flat, acute, glabrous, finely scaberulous on the midrib beneath; ligules very short, reduced to a mere rim; sheaths thin, usually finely pubescent. Panicle narrow, slender, lax, branched at the base, 3-9 in. long; branches erect, capillary. Spikelets narrow, about $\frac{1}{3}$ in. long without the awns, on filiform pedicels. Two outer glumes minute, persistent, many times smaller than the 3rd and 4th, and separated from them by an elongated bearded portion of the rhachilla; 3rd and 4th long and narrow, produced into slender awns, the 4th longer than the 3rd, its awn often more than 1 in. long, nerves 5-7, with the awns rough and scabrid. Flowering glume much shorter, acuminate but not awned, faintly 7-nerved. Palea linear. Lodicules large. Stamens 4.—*Hook. f. Fl. Nov. Zel.* i. 289; *Handb. N.Z. Fl.* 320; *Benth. Fl. Austral.* vii. 552; *Buch. N.Z. Grasses*, t. 2.

NORTH ISLAND: Not uncommon throughout, but most plentiful in lowland districts. SOUTH ISLAND, STEWART ISLAND: In various localities, chiefly near the sea. Sea-level to 2000 ft.

Widely distributed in Australia, ranging from Queensland to Tasmania and West Australia. It is a most valuable pasture and lawn grass, deserving of far more attention than has hitherto been given to it.

2. **M. avenacea**, *Hook. f. Handb. N.Z. Fl.* 320.—Culms tufted, tall, stout, erect or spreading, compressed, glabrous, 1-4 ft. high. Leaves mostly towards the base of the culms and shorter than them, broad, flat, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., glabrous, striate, scaberulous on the margins and principal veins; sheaths long, smooth, deeply striate; ligules broad, bearded at the sides. Panicle 1-2 ft. long, sparingly branched, compound, lax, nodding, pale-green; branches long, slender, almost capillary, angled, scaberulous. Spikelets very narrow, about $\frac{1}{3}$ in. long without the awns, usually 1 in. with them; pedicels slender, thickened above. Two lowest glumes small, many times less than the 3rd and 4th, not separated from them by a conspicuous interspace as in *M. stipoides*, 1-nerved, obtuse, sometimes notched at the tip, the outer one half the length of the 2nd; 3rd and 4th long, narrow, empty, 5-7-nerved, rough and scabrous, hairy at the base, produced into long awns. Flowering glume much shorter than the 4th, acuminate but not awned, faintly 5-7-nerved. Palea linear, acuminate, 1-nerved. Stamens 2.—*Buch. N.Z. Grasses*, t. 3. *Diplax avenacea*, *Raoul, Choix*, 11, t. 3; *Hook. f. Fl. Nov. Zel.* i. 289.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in woods throughout. Sea-level to 2500 ft. December-January.

3. **M. polynoda**, *Hook. f. Handb. N.Z. Fl.* 320.—Culms 3-8 ft. long, much branched, straggling, often scrambling among shrubs and bushes, hard, solid, terete, as thick as a goose-quill at the base, quite glabrous, conspicuously swollen at the nodes. Leaves numerous, rather distant, the lowermost reduced to sheaths, upper

3-9 in. long, $\frac{1}{10}$ - $\frac{1}{5}$ in. broad, linear, finely acuminate, flat, striate, margins scaberulous; sheaths smooth, grooved; ligules short, with a few long hairs on each side. Panicle usually reduced to a simple raceme 1-2 $\frac{1}{2}$ in. long with few spikelets, but sometimes 3-3 $\frac{1}{2}$ in., the lower portion with 1 or 2 short erect 2-3-spiculate branches. Spikelets narrow, compressed, $\frac{1}{2}$ - $\frac{3}{4}$ in. long with the awns. Two lowest glumes small, whitish, many times less than the 3rd and 4th, not separated from them by a distinct interspace, the lowest $\frac{1}{3}$ the length of the 2nd; 3rd and 4th narrow, unequal, empty, awned, rough and scabrous on the sides and awn, hairy at the base. Flowering glume shorter than the 4th, acuminate, 5-7-nerved. Palea linear, 1-nerved. Stamens 4.—*Buch. N.Z. Grasses*, t. 4. *M. ramosissima*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 105. *Diplax polynoda*, *Hook. f. Fl. Nov. Zel.* i. 290.

NORTH ISLAND: Auckland—Whangarei Heads, *T. F. C.*; Great Barrier Island, *Kirk*! Cabbage Bay, *Adams*; Coromandel, *T. F. C.*; Thames, *Kirk*; Te Aroha, *Adams*. Hawke's Bay—Dannevirke, base of the Ruahine Range, *Colenso*! SOUTH ISLAND: Nelson—Motueka Valley, *T. F. C.* Canterbury—*Armstrong*. Otago—Near Dunedin, *Buchanan*! *Petrie*! Sea-level to 1500 ft. December-January.

11. HIEROCHLOE, Gmel.

Erect sweet-scented perennial grasses. Leaves flat. Spikelets in an open or close panicle, laterally compressed, shining, with 1 terminal hermaphrodite flower and 1-2 male flowers below it. Glumes 5; 2 outer empty, equal or nearly so, acute, keeled, scarious, 1-3-nerved; 3rd and 4th subsimilar, often shortly awned, each enclosing a narrow palea and usually 3 stamens; 5th rather smaller, obtuse or mucronate, 5-nerved, enclosing a hermaphrodite flower and a linear 1-2-nerved palea. Lodicules 2. Styles free; stigmas plumose. Grain oblong, free within the slightly indurated flowering glume and palea.

Species 12 or 13, distributed throughout the temperate and frigid zones of both hemispheres. All the species have a vanilla-like fragrance when drying. Of the three found in New Zealand, one is widely spread in the south temperate zone, another extends to Victoria and Tasmania, the third is endemic in the Auckland Islands.

* Two outer glumes about equal to the florets.

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| Culms 2-3 ft. Leaves long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad. Spikelets $\frac{1}{4}$ in. long; outer glumes equalling or slightly exceeding the florets | 1. <i>H. redolens</i> . |
| Culms 6-18 in. Leaves short, $\frac{1}{12}$ - $\frac{1}{5}$ in. broad. Spikelets $\frac{1}{5}$ in. long; outer glumes usually slightly shorter than the florets | 2. <i>H. Fraseri</i> . |

** Two outer glumes much longer than the florets.

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| Culms 1-2 ft. Leaves involute, subcoriaceous. Spikelets $\frac{1}{3}$ in. long | 3. <i>H. Brunonis</i> . |
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1. *H. redolens*, *R. Br. Prodr.* 209.—Culms tufted, leafy, decumbent at the base, erect or ascending above, stout or rather slender, $1\frac{1}{2}$ –3 ft. high or even more. Leaves numerous, shorter than the culms or almost equalling them, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, flat, deeply striate, smooth or minutely scaberulous, bright shining green; sheaths long, compressed, deeply striate; ligules broad, scarious. Panicle pale yellowish-brown, shining, open or dense, inclined or nodding, very variable in size, usually from 4 to 12 in. long, more rarely elongated and reaching 14 or 18 in.; rhachis slender, glabrous; branches very slender, almost capillary, more or less hairy or almost glabrous, lower 2–3 in. long. Spikelets $\frac{1}{4}$ in. long and broad, shortly pedicellate; pedicels shorter than the spikelets, pilose. Glumes all thin and membranous; outer 2 equalling or slightly exceeding the 3rd and 4th, ovate, acuminate, with a stout continuous midrib and a short basal lateral vein on each side; 3rd and 4th each enclosing a male flower, ovate-oblong, obtuse, 5-nerved, pubescent, silky-ciliate on the margins and keel, with a short awn from the back a little below the tip; 5th smaller than the 4th, glabrous below, slightly hairy above, mucronate or very shortly awned. Palea linear-oblong, 1–2-nerved.—*Hook. f. Fl. Antarct.* i. 92; *Fl. Nov. Zel.* i. 300; *Handb. N.Z. Fl.* 321; *Fl. Tasm.* ii. 108; *Benth. Fl. Austral.* vii. 558; *Buch. N.Z. Grasses*, t. 6. *H. antarctica*, *R. Br. Prodr.* 209. *Holcus redolens*, *Forst. Prodr.* n. 563. *Torresia redolens*, *Roem. and Schult. Syst.* ii. 516; *A. Cunn. Precur.* n. 269.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, CAMPBELL ISLAND: Abundant in moist places throughout. Sea-level to 3000 ft.

Also in Fuegia, Tasmania, and Victoria. It varies much in size and degree of robustness, and appears to pass by easy gradations into the next species.

2. *H. Fraseri*, *Hook. f. Fl. Antarct.* i. 93.—Smaller and more slender than *H. redolens*, with narrower leaves. Culms tufted, sometimes densely so, slender, quite smooth and glabrous, 6–18 in. high, rarely more. Leaves much shorter than the culms, 3–9 in. long, strict, erect, flat, $\frac{1}{5}$ – $\frac{1}{2}$ in. broad, quite smooth; ligules broad, scarious. Panicle pale yellowish-brown, often tinged with purple, short, ovate, open, shining, $1\frac{1}{2}$ –4 in. long; branches often few, capillary, usually glabrous. Spikelets $\frac{1}{5}$ in. long and broad, shortly pedicelled; pedicels glabrous or more or less bearded. Glumes all thin and membranous; outer 2 usually slightly shorter than the 3rd and 4th, obtuse or subacute, 3-nerved but the lateral nerves often short; 3rd and 4th each enclosing a male flower, oblong, obtuse, 5-nerved, pubescent, margins silky-ciliate for their whole length, awn short, straight, from the back a little below the tip; 5th smaller than the 4th, glabrous or nearly so at the base, pubescent or ciliate above, tip produced into a short awn. Palea linear, 1–2-nerved.—*H. redolens* var. *Fraseri*, *Benth. Fl. Austral.*

vii. 559. *H. borealis*, Hook. f. *Fl. Nov. Zel.* i. 300; *Fl. Tasm.* ii. 108 (not of Roem. and Schult.). *H. alpina*, Hook. f. *Handb. N.Z. Fl.* 322 (not of Roem. and Schult.); *Buch. N.Z. Grasses*, t. 7.

Var. *recurvata*, Hack. MS.—Awn of 4th glume inserted on the middle of the back of the glume, slightly geniculate above. Spikelets rather larger.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in mountain districts from the East Cape and the Ruahine Mountains southwards. Sea-level to 4500 ft.

Also in Tasmania. A puzzling plant, large states of which cannot be clearly separated from *H. redolens*, although usually differing in the smaller size, slender habit, shorter and more open panicles, and smaller spikelets, with the empty glumes rather shorter than the 3rd and 4th. Sir J. D. Hooker referred it to *H. borealis* in the Flora, and to *H. alpina* in the Handbook. But Professor Hackel remarks that it differs from both of these species in the short blunt outer glumes, and from *H. alpina*, in addition, in the much longer branches of the panicle, and in the awn of the 4th glume being usually inserted just beneath the apex and not geniculate. Var. *recurvata* approaches *H. alpina* in the awn of the 4th glume, but the panicle, &c., is different.

3. *H. Brunonis*, Hook. f. *Fl. Antarct.* i. 93, t. 52.—Culms laxly tufted, inclined at the base, erect above, glabrous, leafy, 1–1½ ft. high. Leaves shorter than the culms, ½–⅓ in. broad, rather strict, suberect, linear-subulate, involute, subcoriaceous, glabrous, deeply striate on the inner face, pale shining green; sheaths compressed, striate; ligules ovate, scarious. Panicle inclined or nodding, shining, rather dense, ovate-lanceolate, 3–5 in. long by 1–1½ in. broad; rhachis slender, glabrous; branches suberect, the lower about 1 in. long. Spikelets ⅓ in. long, pedicelled; pedicels sparsely pilose. Glumes all membranous; outer 2 much longer than the 3rd and 4th, sometimes nearly twice as long, lanceolate, long-acuminate, glabrous, 3-nerved; 3rd and 4th each enclosing a male flower, ovate-oblong, obtuse, 5-nerved, deeply bifid at the tip, pubescent or pilose, margins silky-ciliate, awn rather long, rising from the back a little distance below the base of the lobes; 5th similar to the 4th but smaller and much less pubescent, usually glabrous at the base. Palea linear-oblong, 1–2-nerved.—*Handb. N.Z. Fl.* 322.

AUCKLAND AND CAMPBELL ISLANDS: Abundant on the hills, Sir J. D. Hooker, Kirk! Buchanan! Sea-level to 1400 ft.

The long empty glumes readily separate this from any form of *H. redolens*.

12. STIPA, Linn.

Tufted perennial grasses. Leaves usually convolute, rarely flat. Spikelets narrow, terete, 1-flowered, in an open or contracted panicle; rhachilla disarticulating above the 2 outer glumes. Glumes 3; the 2 outer empty, usually persistent, keeled, acute, rarely awned; 3rd or flowering glume rigid, convolute, terete, 5–7-nerved, usually with a bearded callus at the base, tapering upwards into an

entire or minutely 2-lobed tip, with a long terminal geniculate awn often spirally twisted below the bend. Palea 2-nerved, enclosed within the flowering glume. Lodicules usually 3, large. Stamens 3, seldom fewer. Styles distinct, rather short. Grain narrow, terete, tightly enclosed by the hardened flowering glume and palea.

A genus of over 100 species, spread over the temperate and tropical regions of both hemispheres. Two of the New Zealand species extend to Australia, the third is endemic.

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| Tall, 2-5 ft. Panicle 1-2½ ft., lax, nodding. Spikelets minute, $\frac{1}{10}$ - $\frac{1}{8}$ in. Stamen 1 | 1. <i>S. arundinacea</i> . |
| Densely tufted, 1-3 ft. Leaves long, terete. Panicle 4-9 in., narrow, strict, erect. Spikelets $\frac{3}{8}$ in. | 2. <i>S. teretifolia</i> . |
| Tufted, 1-2 ft. Leaves short, filiform. Panicle 4-8 in., lax, erect. Spikelets $\frac{1}{2}$ in. | 3. <i>S. setacea</i> . |

1. *S. arundinacea*, *Benth. in Journ. Linn. Soc.* xix. (1881) 81.—Rhizomes short, creeping, scaly. Culms very densely tufted, tall, erect, nodding, rigid, quite glabrous, 2-5 ft. high. Leaves from the distant nodes of the culms, the lowermost reduced to appressed sheaths, upper 6-12 in. long, $\frac{1}{8}$ - $\frac{1}{5}$ in. broad, coriaceous, flat or involute, margins and midrib slightly scaberulous; sheaths very long, closely appressed, finely ciliate along the margins; ligules short, truncate. Panicles very large and lax, nodding, 1-2½ ft. long; rhachis very slender, glabrous; branches in distant whorls of 5-8, capillary, again compound, spreading, finely scaberulous, 3-6 in. long. Spikelets minute, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, greenish-purple. Two outer glumes almost equal, lanceolate, acuminate, membranous, scaberulous along the keel, lower 1-nerved, upper 3-nerved; 3rd or flowering glume much shorter, sessile on a short glabrous callus, rigid, convolute, pubescent towards the tip; awn slender, scabrid, deciduous, about $\frac{1}{3}$ in. long. Palea linear-oblong, 2-nerved. Stamen 1.—*Apera arundinacea*, *Hook. f. Fl. Nov. Zel.* i. 295, t. 67; *Handb. N.Z. Fl.* 326; *Buch. N.Z. Grasses*, t. 17. *A. purpurascens*, *Col. in Trans. N.Z. Inst.* xxi. (1889) 106.

NORTH AND SOUTH ISLANDS: Auckland—East Cape, *Bishop Williams*. Hawke's Bay—Petane, *A. Hamilton*! Dannevirke and Cape Turnagain, *Colenso*! Wellington—Wairarapa, *Buchanan*! South Karori, *Kirk*. Nelson—Foxhill, Wangapeka, *T. F. C.* Marlborough—Pelorus Valley, *Rutland*! Canterbury—Akaroa, *Raoul, Kirk*! Otago—Near Dunedin, *Buchanan*! *Petrie*! *G. M. Thomson*! Horse Ranges and Kaitangata, *Petrie*. Sea-level to 1500 ft.

A very handsome species. It is closely allied to *S. verticillata*, *Nees (Streptachne ramosissima, Trin.)*, an Australian species which is often grown in gardens, and which has established itself in several localities, but which differs in the rather larger spikelets with a much longer persistent awn, and in having 3 stamens.

2. *S. teretifolia*, *Steud. Syn. Pl. Gram.* 128.—Culms densely tufted, forming large tussocks, rigid, erect, smooth and polished, quite glabrous, 1½-3 ft. high. Leaves longer or shorter than the

culms, slender, smooth, rigid, terete, about $\frac{1}{30}$ in. diam., tips acicular; sheaths long, margins scarious; ligules membranous, entire. Panicle narrow, strict, erect, 4–9 in. long; rhachis smooth; branches few, erect, capillary, and with the pedicels glabrous. Spikelets narrow, about $\frac{3}{4}$ in. long without the awn. Two outer glumes subequal, lanceolate, acuminate, finely 3-nerved, membranous, pale whitish-green; 3rd or flowering glume much shorter, rigid and convolute, lanceolate, acuminate, densely clothed with long silky hairs, shortly bifid at the apex; awn from between the lobes, often over 1 in. long, curved or abruptly bent, minutely pubescent. Palea $\frac{3}{4}$ the length of the flowering glume, linear, silky, 2-nerved. Stamens 3.—*Benth. Fl. Austral.* vii. 567. *Dichelachne stipoides*, *Hook. f. Fl. Nov. Zel.* i. 294, t. 66; *Handb. N.Z. Fl.* 325; *Buch. N.Z. Grasses*, t. 14.

NORTH ISLAND: Rocky or sandy places near the sea, from the North Cape to the Bay of Plenty, abundant.

Not uncommon in Australia and Tasmania. Hooker quotes *Agrostis rigida*, A. Rich., as a synonym, but Richard's description does not suit, and his plant was gathered in the French Pass, near Nelson, far beyond the southern limit of *S. teretifolia*.

3. *S. setacea*, *R. Br. Prodr.* 174.—Culms tufted, slender, wiry, erect, glabrous, 1–2 ft. high. Leaves numerous towards the base of the culms and much shorter than them, very slender, almost filiform, erect, smooth, involute; sheaths closely appressed, smooth; ligules narrow, membranous. Panicle lax, strict, erect, glabrous, 4–8 in. long; rhachis smooth; branches whorled, capillary, each with 2–5 spikelets; pedicels minutely scaberulous. Spikelets $\frac{1}{4}$ in. long without the awn, pale whitish-green. Two outer glumes almost equal, lanceolate, acuminate, very thin and membranous, almost hyaline, glabrous; 3rd or flowering glume much shorter, rigid, convolute, brownish, densely villous, entire at the tip; awn very slender, glabrous, 1–1½ in. long. Palea linear, silky, 2-nerved. Stamens 3.—*Hook. f. Fl. Tasm.* ii. 110, t. 157B; *Benth. Fl. Austral.* vii. 568; *Kirk in Trans. N.Z. Inst.* xiv. (1882) 336; *Petrie in Trans. N.Z. Inst.* xix. (1887) 326. *S. Petriei*, *Buch. N.Z. Grasses*, t. 17 ii.

SOUTH ISLAND: Otago—Cromwell, Kurow, Duntroon, and other localities in the interior of Otago, *Petrie!* 500–1500 ft.

A common Australian plant, stretching from Queensland to Tasmania. It is probably naturalised only in New Zealand.

13. *ECHINOPOGON*, Beauv.

An erect or ascending glabrous grass. Leaves flat. Spikelets 1-flowered, crowded in a short and dense spike-like panicle; rhachilla disarticulating above the 2 outer glumes, produced beyond the flower into a short bristle. Glumes 3; 2 outer subequal, persistent, empty, awnless, keeled, acute; 3rd or flowering glume

broad, thin, 5-nerved, 3-lobed at the tip, the lateral lobes short and acute, the middle one produced into a straight stiff awn. Palea shorter than the flowering glume, narrow, 2-nerved. Lodicles 2. Stamens 3. Styles distinct; stigmas shortly plumose. Grain free within the flowering glume.

The genus is confined to the following species, which has a wide range in Australia as well as in New Zealand.

1. *E. ovatus*, Beauv. *Agrost.* 42, t. 9.—Culms laxly tufted, decumbent at the base, erect above, slender, stiff, minutely scabrid above, 9–24 in. high. Leaves 1–6 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, flat, striate, margins and both surfaces harsh and scabrid; sheaths rather long, closely appressed, deeply striate, scabrid with reversed projections; ligule short, membranous, lacerate. Spike-like panicle varying in size from $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, ovoid-globose to narrow-oblong, bristling with the long awns; branches short, densely packed. Spikelets compressed, $\frac{1}{10}$ – $\frac{1}{8}$ in. long without the awns. Two outer glumes subequal, lanceolate, acute, sharply keeled, keel very prominent, green, ciliate; 3rd or flowering glume equalling or slightly exceeding the empty glumes, broad, furnished at the base with a pencil of silky hairs, awn rigid, scabrous, $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Palea linear-oblong, 2-nerved, with a hairy bristle-like continuation of the rachilla at its back.—*Hook. f. Fl. Nov. Zel.* i. 298; *Handb. N.Z. Fl.* 325; *Benth. Fl. Austral.* vii. 599; *Buch. N.Z. Grasses*, t. 13b. *Agrostis ovata*, *Forst. Prodr.* n. 40; *A. Rich. Fl. Nouv. Zel.* 128; *A. Cunn. Precur.* n. 247; *Raoul, Choix*, 39. *Cinna ovata*, *Kunth, Enum.* i. 208. *Hystericina alopecuroides*, *Steud. Syn. Pl. Gram.* 35.

NORTH AND SOUTH ISLANDS: Not uncommon in dry places throughout. Sea-level to 2500 ft.

14. *ALOPECURUS*, Linn.

Annual or perennial grasses. Leaves flat. Spikelets strongly laterally compressed, 1-flowered, densely crowded in a cylindric spike-like panicle, articulated on the top of the very short pedicels. Glumes 3; the 2 outer subequal, often connate below, sharply keeled, acute or obtuse, not awned, often fringed on the keels; 3rd or flowering glume about as long as the outer glumes, convolute, hyaline, usually with a slender bent dorsal awn. Palea generally wanting. Lodicles absent. Stamens 2 or 3. Styles distinct or connate. Grain laterally compressed, free within the flowering glume and palea.

Species about 20, in the temperate and cool regions of both hemispheres, several of them excellent fodder-grasses. The single New Zealand species is widely distributed.

1. *A. geniculatus*, Linn. *Sp. Plant.* 60.—Culms creeping and rooting at the base, erect above, rather slender, glabrous, 9–18 in.

high. Leaves short, soft, flat, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad; upper sheaths long, grooved, more or less inflated; ligules long, membranous. Spike 1–2 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, dense, cylindric, greenish-yellow; branches short, the ultimate ones bearing a single spikelet. Spikelets numerous, closely imbricating, much compressed, $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Two outer glumes slightly connate at the base, obtuse or subacute, membranous, pubescent, ciliate along the keel; 3rd or flowering glume rather shorter than the empty ones, thin, convolute, truncate and erose at the tip; awn slender, not twice the length of the glume, almost basal, straight or recurved. Anthers linear, orange-yellow.—*Hook. f. Fl. Nov. Zel.* i. 290; *Handb. N.Z. Fl.* 321; *Benth. Fl. Austral.* vii. 555; *Buch. N.Z. Grasses*, t. 5.

NORTH ISLAND: Auckland—Lower Waikato, *H. Carse*! East Cape district, *Bishop Williams*! Hawke's Bay—*Colenso*! Wellington—Wairarapa, *Buchanan*! near Wellington, *Kirk*! SOUTH ISLAND: Not uncommon in marshy places throughout. Sea-level to 3500 ft. *Marsh Foxtail*.

An abundant grass in marshy places in most temperate regions. The allied species *A. pratensis* (Meadow Foxtail) and *A. agrestis* (Slender Foxtail), descriptions of which will be found in any British flora, have become naturalised in several localities in both Islands.

15. SPOROBOLUS, R. Br.

Annual or perennial grasses, of very various habit. Leaves flat or convolute. Spikelets small, often minute, 1-flowered, awnless, arranged in a narrow spike-like or effuse panicle; rhachilla very short, obscurely jointed above the 2 outer glumes, not produced beyond the flower or very rarely so. Glumes 3, membranous, nerveless or 1–3-nerved; 2 outer unequal, empty, persistent or separately deciduous; 3rd or flowering glume longer than or equaling the 2nd. Palea usually almost as long as the flowering glume, 2-nerved, often splitting between the nerves. Lodicules 2, small. Stamens 2–3. Styles short, distinct. Grain free within the flowering glume and palea; the pericarp lax, usually deciduous.

Species about 80, dispersed through the tropical and subtropical regions of both hemispheres, but most numerous in America.

1. *S. indicus*, R. Br. *Prodr.* 170.—Perennial. Culms tufted, stout, rigid, perfectly glabrous, 1–2 ft. high. Leaves mostly at the base of the culms and shorter than them, 4–12 in. long, $\frac{1}{2}$ – $\frac{1}{3}$ in. broad, usually involute, tapering to a fine point, glabrous, margins smooth; sheaths pale, compressed, often ciliate on the margins; ligules reduced to a ciliate rim. Panicle erect, spike-like, very narrow, 3–9 in. long, sometimes interrupted below; branches short, crowded, erect and appressed to the rhachis. Spikelets very numerous, crowded, $\frac{1}{2}$ in. long. Two outer glumes unequal, the lowest not much more than one-half the length of the 2nd, hyaline, nerveless, or the 2nd 1-nerved; 3rd or flowering glume nearly twice

as long as the 2nd, oblong-lanceolate, acute, 1-3-nerved. Palea almost as long as the flowering glume. Stamens usually 2. Grain obovoid or roughly quadrangular, reddish; pericarp thin.—*Benth. Fl. Austral.* vii. 622. *S. elongatus*, *R. Br. Prodr.* 170; *Hook. f. Fl. Nov. Zel.* i. 295; *Handb. N.Z. Fl.* 327; *Buch. N.Z. Grasses*, t. 18.

NORTH AND SOUTH ISLANDS: Lowland districts from the North Cape to Nelson and Marlborough, abundant, especially in the northern part of the North Island. *Ratstail*.

A common grass in all warm countries. Although now presenting all the appearance of a true native, it is certainly introduced into New Zealand. Bishop Williams informs me that it made its first appearance at the Bay of Islands in 1840, shortly after the arrival of a ship called the "Surabaya," which, while on a voyage from Valparaiso to Sydney, laden with horses and forage, put into the Bay of Islands in a disabled state, and was there condemned and her cargo sold. *Erigeron canadensis* and other weeds appeared at the same time.

16. SIMPLICIA, T. Kirk.

A slender decumbent grass. Leaves flat. Spikelets minute, 1-flowered, solitary and pedicelled on the branches of a slender panicle; rhachilla disarticulating above the 2 outer glumes, produced above the flower into a minute bristle. Glumes 3; 2 outer minute, unequal, empty, hyaline, persistent; 3rd or flowering glume much longer than the outer glumes, oblong-lanceolate, acuminate or shortly awned, keeled, obscurely 1-3-nerved. Palea almost as long as the flowering glume, 2-nerved. Lodicules 2. Stamens 1-2. Styles distinct; stigmas shortly plumose. Grain oblong, free within the flowering glume and palea.

A peculiar monotypic genus, endemic in New Zealand. Professor Hackel considers it to be intermediate between *Sporobolus* and *Agrostis*, differing from the former in the rhachilla being produced beyond the flower, and from the latter in the minute unequal empty glumes, large palea, &c. Mr. Kirk compared it to *Muhlenbergia*.

1. *S. laxa*, T. Kirk in *Trans. N.Z. Inst.* xxix. (1897) 497.—Culms weak, decumbent, very slender, filiform, 8-18 in. long. Leaves 1-4 in. long by $\frac{1}{10}$ - $\frac{1}{8}$ in. broad, flat, flaccid, glabrous or minutely ciliate along the nerves; sheaths long, glabrous or pubescent; ligule long, membranous. Panicle very slender, narrow, 2-6 in. long; rhachis filiform; branches few, filiform, erect, smooth or minutely scaberulous. Spikelets lanceolate, pale-green, about $\frac{1}{12}$ in. long. Two outer glumes minute, unequal, glabrous, the lower $\frac{2}{3}$ the length of the upper, which is $\frac{1}{4}$ the length of the flowering glume; 3rd or flowering glume acuminate or shortly awned, pubescent with short stiff erect hairs. Palea almost as long as the flowering glume, acute, pubescent. Ripe grain not seen.

NORTH ISLAND: Wellington—Dry River, Ruamanga, Lower Wairarapa, Kirk! SOUTH ISLAND: Otago—Deep Stream, Waikouaiti, Petrie!

17. **AGROSTIS**, Linn.

Annual or perennial grasses, of very various habit. Leaves usually flat, sometimes setaceous, often flaccid; ligules membranous. Spikelets small, 1-flowered, arranged in effuse or contracted panicles with capillary whorled branches; rhachilla disarticulating above the 2 outer glumes, not produced beyond the flower. Glumes 3; 2 outer equal or subequal, empty, keeled, acute, not awned, usually 1-nerved; 3rd or flowering glume membranous or hyaline, glabrous or hairy, usually truncate, 5-nerved or rarely 3-nerved, with a dorsal awn or unawned, callus glabrous or with a few minute hairs. Palea usually short, often minute or wanting, thin and delicate, hyaline, 2-nerved or nerveless. Lodicules 2. Stamens 3. Styles very short, distinct; stigmas plumose. Grain oblong, free within the flowering glume.

Species about 100, found in all parts of the world, but most abundant in temperate regions, and penetrating as far into the arctic and antarctic zones as any other grasses. Of the 7 species admitted in this work, one is generally distributed in high southern latitudes, two or possibly three are found in Australia, the remainder are endemic.

* Awn of flowering glume distinctly exerted beyond the empty glumes.

Culms 3-18 in. Panicle contracted, 1-4 in. Spikelets
 $\frac{1}{8}$ in. long; pedicels almost hispid 1. *A. magellanica*.

** Awn of flowering glume often wanting; when present not exceeding the empty glumes.

Minute, softly pulvinate, seldom more than 1 in. high.

Panicle usually sunk among the leaves 2. *A. muscosa*.

Slender, strict, densely tufted, 2-9 in. Panicle narrow, almost spike-like, $\frac{1}{2}$ -2 in. long 3. *A. Muelleri*.

Tufted, 4-18 in.; innovation-shoots intravaginal, without leafless scales at the base. Panicle 2-5 in., contracted, rather dense; branches numerous. Spikelets $\frac{1}{10}$ - $\frac{1}{8}$ in., empty glumes scabrid on the keel 4. *A. Dyeri*.

Laxly tufted, 6-18 in.; innovation-shoots extravaginal, with leafless scales at the base. Panicle 2-6 in., lax; branches in whorls of 3-5. Spikelets $\frac{1}{8}$ in., empty glumes smooth 5. *A. Petrici*.

Weak, very slender, 6-18 in. Panicle 2-6 in., lax and spreading; branches few, capillary, trichotomously divided. Spikelets minute, $\frac{1}{15}$ in. 6. *A. parviflora*.

Laxly tufted, very slender, 6-15 in. Panicle linear, $\frac{1}{2}$ -4 in. by $\frac{1}{10}$ - $\frac{1}{8}$ in.; branches short, erect. Spikelets $\frac{1}{12}$ - $\frac{1}{10}$ in., pale, shining 7. *A. tenella*.

Two common European species, *A. vulgaris* (Red-top) and *A. alba* (Fiorin), are copiously naturalised in most parts of the colony. They come nearer to *A. Dyeri* than to any other of the indigenous species, but differ in the creeping rootstocks, laxer panicles, and in the florets having a well-developed palea. Descriptions of them will be found in any British Flora.

1. *A. magellanica*, Lam. Ill. i. 160.—Culms tufted, very variable in size, 3-18 in. high, erect or shortly decumbent at the base,

stout or slender, quite glabrous, leafy. Leaves numerous, shorter than the culms, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, involute, striate, scaberulous on the margins and veins; sheaths long, contracted at the mouth, deeply grooved, pale; ligules oblong, membranous, truncate at the apex, lacerate. Panicle 1–4 in. long, $\frac{1}{4}$ – $\frac{3}{4}$ in. broad, contracted, linear-oblong, rather dense, erect or inclined; rhachis stout, scabrid; branches numerous, whorled, erect, scaberulous. Spikelets $\frac{1}{6}$ in. long, light-green or purplish; pedicels usually shorter than the spikelets, scabrid, thickened at the tips. Two outer glumes subequal, lanceolate, acuminate, ciliate or almost hispid along the keel, sides scaberulous; 3rd or flowering glume $\frac{1}{2}$ the length of the 2nd or rather shorter, membranous, glabrous, truncate at the apex and more or less evidently 4-cuspidate, awn from half-way down the back, straight or flexuous or slightly recurved, usually longer than the spikelet. Palea very short, hardly exceeding the ovary, sometimes wanting.—*Hook. f. in Phil. Trans.* clxviii. (1879) 21. *A. antarctica*, *Hook. f. Fl. Antarct.* ii. 374, t. 132; *Handb. N.Z. Fl.* 327. *A. multicaulis*, *Hook. f. Fl. Antarct.* i. 95.

SOUTH ISLAND: Otago—Head of Clinton Valley, near Lake Te Anau, *Petrie!*
AUCKLAND AND CAMPBELL ISLANDS: *Sir J. D. Hooker, Kirk!* ANTIPODES
ISLAND: *Kirk!* MACQUARIE ISLAND: *A. Hamilton.*

Also found in Chili, Fuegia, the Falkland Islands, Kerguelen Island, Marion and Heard Islands. *Sir J. D. Hooker*, in his memoir on the flora of Kerguelen Island (*Phil. Trans.* Vol. clxviii.) has reduced both *A. antarctica* and *A. multicaulis* to *A. magellanica*, Lam. Professor Hackel concurs in this, remarking that *A. antarctica* only differs from the typical *A. magellanica* in the less-pointed outer glumes, and that *A. multicaulis* is only a dwarfed state, not separable as a distinct variety.

2. *A. muscosa*, *T. Kirk in Trans. N.Z. Inst.* xiii. (1881) 385.—Minute, very densely tufted, forming small rounded cushion-like patches 1–2 in. diam., and less than 1 in. high. Culms densely packed, much branched at the base, leafy throughout. Leaves longer or shorter than the culms, pale glaucous-green; blades spreading, flaccid, involute, almost capillary; sheaths shorter or longer than the blades, lax, whitish, membranous, grooved; ligules long, subulate. Panicle very short and dense, often concealed among the leaves, contracted into a close rounded head $\frac{1}{8}$ – $\frac{1}{6}$ in. diam., usually many-spiculate, but in depauperated states the spikelets may be reduced to 2–6, or in large states the panicle may be lengthened to $\frac{1}{4}$ – $\frac{1}{3}$ in.; branches short, sparsely hairy. Spikelets about $\frac{1}{2}$ in. long, pale-green. Two outer glumes subequal, ovate-lanceolate, acute, with a green scabrid keel and thin hyaline margins; 3rd or flowering glume about $\frac{1}{4}$ shorter, ovate-oblong, truncate, 5-nerved, awn wanting. Palea wanting. Grain broadly oblong.—*A. Spencei*, *Kirk in Trans. N.Z. Inst.* xxix. (1897) 539 (name only). *A. æmula* var. *spathacea*, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 32, t. 7, f. 41–47.

NORTH ISLAND: Omatangi, near Lake Taupo, *Berggren*! Lake Rotoaira, *Kirk*! Mount Egmont, *T. F. C.*; Tararua Ranges, *T. P. Arnold*! SOUTH ISLAND: Nelson—Mount Owen, *T. F. C.* Canterbury—Broken River Basin, *Enys*! *Kirk*! *T. F. C.*; Mackenzie Plains, *T. F. C.* Otago—Not uncommon in the eastern and southern portions of the province, *Petrie*! *Kirk*! Altitudinal range usually from 1500 to 4500 ft., but descending to sea-level in Southland.

3. *A. Muelleri*, *Benth. Fl. Austral.* vii. 576.—Culms compactly tufted, slender, strict, erect, smooth, 1–2-noded, the nodes near the base of the culm, 2–9 in. high. Leaves crowded near the base of the culms and usually much shorter than them, very narrow, often filiform, strict, erect, involute, smooth and glabrous; sheaths long, grooved, glabrous; ligules scarious, narrow-oblong. Panicle very narrow, almost spike-like, $\frac{1}{2}$ –2 in. long, erect, purplish or pale-green; rhachis smooth or obscurely scabrid; branches in fascicles of 2–5, unequal, short, erect, capillary, scabrid. Spikelets about $\frac{1}{10}$ in. long. Two outer glumes slightly unequal, oblong-lanceolate, acute, green or purplish, usually scabrid or ciliate on the keel, but sometimes glabrous, margins thin and hyaline; 3rd or flowering glume about $\frac{1}{3}$ shorter, thin and membranous, truncate, minutely denticulate, smooth, faintly 5-nerved, awn usually absent but sometimes present from the middle of the back. Palea wanting. Grain oblong.—*A. gelida*, *F. Muell. in Trans. Vict. Inst.* (1855) 43 (not of *Trin.*). *A. canina* var. *Hook. f. Handb. N.Z. Fl.* 328; *Buch. N.Z. Grasses*, t. 20, f. A. (?) *A. subulata*, *Hook. f. Fl. Antarct.* i. 95, t. 53.

Var. *paludosa*, *Hack. MS.*—Culms 3-noded, the uppermost node higher up the culm than in the type. Panicle broader and laxer. Spikelets straw-coloured.

NORTH ISLAND: Ruahine Mountains, *Colenso*, *A. Hamilton*! SOUTH ISLAND: Common in mountain districts throughout. Var. *paludosa*: Swamps by the Broken River, *Kirk*! Tasman Valley, *T. F. C.* 2500–5500 ft. Also in Australia.

Very closely allied to *A. Dyeri*, from which it only differs in its smaller size and narrow panicle. Var. *paludosa* has a very distinct appearance, and I had placed it as a separate species, but Professor Hackel considers that it is only entitled to the rank of a variety.

4. *A. Dyeri*, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 441.—Perennial; innovation-shoots intravaginal, not clothed at the base with leafless scales. Culms tufted, 4–18 in. high, slender, erect or geniculate at the base, glabrous, 2–3-noded, the upper node considerably below the culm. Leaves shorter than the culms, $\frac{1}{12}$ – $\frac{1}{5}$ in. broad, flat or convolute when dry, striate, scaberulous on the margins and both surfaces; sheaths terete, grooved, glabrous, the upper long; ligules oblong, obtuse, membranous, lacerate. Panicle elongated, usually from 2 to 5 in. long, but shorter in depauperated forms, erect, usually more or less contracted, rarely open, green or brownish-green; rhachis slender, scaberulous above; branches in rather distant fascicles placed alternately on opposite sides of the

rhachis, strict, erect, capillary, scaberulous, simple or branched from the base or above; pedicels longer or shorter than the spikelets. Spikelets $\frac{1}{10}$ – $\frac{1}{8}$ in. long. Two outer glumes subequal, lanceolate, acute, 1–3-nerved, scabrid on the keel; 3rd or flowering glume about $\frac{1}{2}$ shorter than the 2nd, oblong, truncate, minutely 4-toothed, awnless. Palea wanting. Anthers small.—*A. canina*, *Hook. f. Fl. Nov. Zel.* i. 296; *Handb. N.Z. Fl.* 328; *Buch. N.Z. Grasses*, t. 19 (not of *Linn.*). *A. parviflora*, *Buch. N.Z. Grasses*, t. 20c (not of *R. Br.*).

Var. **aristata**, *Hack. MS.*—Flowering glume awned. Other characters as in the type.

Var. **delicatio**, *Hack. MS.*—More slender. Panicle broader, much more lax. Spikelets $\frac{1}{2}$ smaller. Flowering glume awned.

NORTH AND SOUTH ISLANDS: Mountain districts from the East Cape, Taupo, and Mount Egmont southwards, abundant. 1000–5000 ft.

Sir J. D. Hooker referred this plant, both in the Flora and in the Handbook, to the northern *A. canina*, *Linn.*, and no doubt it is closely allied to that species. But Professor Hackel informs me that it does not exactly match any form of *A. canina*, and in his opinion must be treated as a distinct species, differing from *A. canina* in the innovation-shoots being always intravaginal, in the more scabrid leaves, in the narrower and more contracted panicle, and in the rather larger spikelets. It usually constitutes a large proportion of the subalpine pastures in elevated districts in both Islands.

5. ***A. Petriei***, *Hack. in Trans. N.Z. Inst.* xxxv. (1903) 379.—Perennial; innovation-shoots extravaginal, clothed at the base with leafless scales gradually increasing in size. Culms tufted, slender, erect, 6–18 in. high, glabrous, 3–5-noded, upper node almost at the middle of the culm. Leaves 2–5 in. long, $\frac{1}{15}$ – $\frac{1}{12}$ in. broad, linear, acute, flat or convolute when dry, glaucous, scabrid on the margins and both surfaces; sheaths terete, glabrous; ligules long, oblong, obtuse, denticulate. Panicle 2–6 in. long, oblong, open, lax-flowered; rhachis smooth; branches in whorls of 3–5, capillary, scaberulous, again branched; pedicels hardly thickened at the tips, about equal in length to the spikelets. Spikelets linear-lanceolate, $\frac{1}{8}$ in. long, pale-green. Two outer glumes equal, lanceolate, acute, 1-nerved, smooth; 3rd or flowering glume $\frac{1}{4}$ shorter, thin and membranous, obtuse, minutely denticulate, 5-nerved; awn from the middle of the back, straight, about as long as the empty glumes, rarely wanting, callus set with short hairs. Palea wanting. Anthers large.

Var. **mutica**, *Hack. MS.*—Awn wanting.

SOUTH ISLAND: Otago—Cromwell, Nevis Valley, Dunstan Mountains, *Petrie*! Lake Wakatipu, *Kirk*! 1000–2500 ft.

According to Professor Hackel this is nearest to *A. canina*, which differs in its bright-green smooth leaves, much more compound and closer panicle, smaller spikelets, in the scabrid keel of the empty glumes, and small anthers. *A. Dyeri*

is separated by the innovation-shoots being intravaginal and not clothed with leafless scales, to say nothing of the broader leaves, dense panicle, and spikelets with the empty glumes scabrid on the keel.

6. *A. parviflora*, R. Br. *Prodr.* 170.—Culms laxly tufted, very slender, weak, often decumbent or prostrate at the base, erect or ascending above, quite smooth, 6–18 in. long. Leaves chiefly towards the base of the culms, the lowermost soon withering, 2–6 in. long, usually narrow and often almost filiform, but in luxuriant specimens broader and sometimes $\frac{1}{12}$ – $\frac{1}{10}$ in. diam., flaccid, flat or involute, smooth or the margins minutely scabrid; sheaths long, grooved, quite smooth; ligules long, membranous, lacerate. Panicle varying in length from 2 to 6 in. or more, compound, very lax and slender, drooping; primary branches long, capillary, scaberulous, erect at first but soon spreading, trichotomously divided, lowermost in clusters of 4–6, upper in distant pairs; secondary branches from above the middle, again divided; pedicels thickened at the tips. Spikelets very minute, about $\frac{1}{15}$ in. long, shining, pale-green, sometimes tinged with purple. Two outer glumes slightly unequal, lanceolate, acute, membranous, slightly scabrid on the keel, margins hyaline; 3rd or flowering glume about $\frac{1}{4}$ shorter, broad, truncate, hyaline, delicately 5-nerved, awnless. Palea wanting.—*Hook. f. Fl. Nov. Zel.* i. 296; *Handb. N.Z. Fl.* 328. *A. scabra*, *Benth. Fl. Austral.* vii. 576 (not of Willd.).

NORTH ISLAND: Inland Patea and shores of Cook Strait, *Colenso*! SOUTH ISLAND: Pelorus Valley, *J. Macmahon*! near Westport, *Townson*! near Dunedin, *Petrie*!

I am greatly puzzled with this species, which can be recognised without much difficulty by the weak habit, very slender lax spreading panicle, and minute spikelets, which are smaller than those of any other New Zealand species. It was originally referred to *A. parviflora* by Hooker in the *Flora*, but does not quite match the plate of that species given in the "*Flora Tasmanica*" (t. 158), nor any Australian specimens that I have seen. Bentham referred the Australian plant to *A. scabra*, Willd., a North American species; but that is a larger and more erect plant, with a more copiously divided panicle, and with narrower spikelets, much more scabrid on the keel. Professor Hackel, who has examined my specimens, says, "Not easy to name. Surely not *A. scabra*, Willd., but very near the North American *A. perennans*, Tuck. It is most probably *A. parviflora*, R. Br., but without seeing one of Brown's types I cannot be quite sure of the identity." It should be mentioned that most of the specimens referred to *A. parviflora* by New Zealand botanists are nothing but small states of *A. Dyeri*, Petrie, (the *A. canina* of the Handbook), as, for instance, the plant figured as *A. parviflora* by Buchanan in his *New Zealand Grasses*, t. 20c. All such specimens can be at once distinguished by the strict habit, contracted panicle, and larger spikelets.

7. *A. tenella*, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 442.—Apparently annual. Culms laxly tufted, erect, very slender, quite smooth and glabrous, 3–4-noded, 6–15 in. high. Leaves few, much shorter than the culms, erect, very narrow, filiform or setaceous, involute, finely striate; sheaths rather long, close, smooth;

ligules oblong, obtuse, lacerate. Panicle very long and narrow, $1\frac{1}{2}$ –4 in. by $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, erect, pale-green; rhachis minutely scaberulous; branches few, fascicled, very short, erect; pedicels short, capillary, scaberulous. Spikelets $\frac{1}{12}$ – $\frac{1}{10}$ in. long, pale. Two outer glumes subequal, lanceolate, acute, shining, 1-nerved, slightly scabrid on the keel, smooth on the sides; 3rd or flowering glume about $\frac{1}{4}$ shorter, ovate-lanceolate, thin and hyaline, truncate, minutely denticulate, glabrous, faintly 5-nerved, awn wanting. Grain oblong.

SOUTH ISLAND: Canterbury—Broken River, *Petrie*! Porter River, *Kirk*! Otago—Macrae's, Lake Wakatipu, *Petrie*! 1000–3000 ft.

A very distinct species, easily recognised by the very slender habit, excessively narrow pale-green panicle, and small shining spikelets.

18. DEYEUXIA, Clarion.

Annual or perennial grasses. Leaves flat or involute; ligules membranous. Spikelets small, 1-flowered, arranged in effuse or contracted or spike-like panicles with capillary whorled branches; rhachilla disarticulating above the 2 outer glumes, produced beyond the flower into a silky bristle. Glumes 3; 2 outer equal or subequal, persistent, empty, keeled, acute, not awned, usually 1-nerved; 3rd or flowering glume shorter than the empty glumes or equalling them, thin and hyaline or rigidly membranous or almost coriaceous, 5-nerved, entire or 2–4-dentate, callus at the base silky; awn generally present, straight or twisted, inserted above or below the middle of the glume. Palea more than half as long as the flowering glume or almost equalling it, thin, 2-nerved or 2-keeled. Stamens 3. Styles distinct, short; stigmas plumose. Grain oblong or obovoid, enclosed within the flowering glume and palea.

Species over 100, widely dispersed through the temperate regions of both hemispheres, particularly abundant in Andine South America. It is not at all easy to separate *Deyeuxia* from the allied genera *Agrostis* and *Calamagrostis*, and of late many authors, including Hackel, have placed the majority of species under the latter genus. It appears to me, however, that there is much to be said in favour of the arrangement proposed in Hooker's "Flora of British India" (Vol. vii., p. 253), where *Agrostis* is limited to species in which the rhachilla is not produced at the back of the flower, and in which the callus of the flowering glume is naked or nearly so, *Calamagrostis* containing those in which there is also no prolongation of the rhachilla, but which have the callus villous with long hairs, while in *Deyeuxia* the species have both an elongated rhachilla and hairy callus. Understood in this sense, there are 7 New Zealand species of the genus, 3 of which extend to Australia and Tasmania, the remaining 4 being endemic.

* Flowering glume $\frac{1}{3}$ – $\frac{1}{2}$ shorter than the empty glumes, thin and hyaline. Panicle very broad and lax; branches long, spreading, capillary.

Spikelets $\frac{1}{2}$ – $\frac{1}{3}$ in. Flowering glume silky, truncate,
minutely 4-denticulate; awn from the middle of the
back 1. *D. Forsteri*.

Spikelets $\frac{1}{2}$ – $\frac{3}{4}$ in. Flowering glume silky at the base only, 2 lateral nerves produced into short awns, dorsal awn from below the middle of the back 2. *D. Billardieri*.

** Flowering glume not much shorter than the empty glumes, rigidly membranous. Panicle narrow, contracted.

Slender, 4–12 in. Leaves filiform. Panicle 1–2½ in. Spikelets $\frac{1}{2}$ in. long; callus-hairs very long 3. *D. setifolia*.

Slender, 9–36 in. Leaves narrow, involute. Panicle 2–5 in. Spikelets $\frac{1}{2}$ – $\frac{3}{4}$ in.; awn from below the middle, exserted; callus-hairs short. Rhachilla obviously produced .. 4. *D. avenoides*.

Tall, slender, 2–4 ft. Leaves flat, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad. Panicle 4–6 in. Spikelets $\frac{1}{2}$ – $\frac{3}{4}$ in.; awn short, almost terminal. Rhachilla obviously produced 5. *D. Youngii*.

Tall, stout or slender, 1–3 ft. Leaves flat or involute. Panicle 2–6 in. Spikelets $\frac{1}{2}$ in.; flowering glume 4-cuspidate; awn from near the base. Rhachilla not produced or very obscurely so 6. *D. quadriseta*.

Slender, 1–3 ft. Leaves flat, flaccid. Panicle 3–6 in., lax but narrow. Spikelets $\frac{1}{2}$ – $\frac{3}{4}$ in.; callus-hairs long; awn from about the middle. Rhachilla obviously produced 7. *D. Petriei*.

1. *D. Forsteri*, Kunth, *Rev. Gram.* i. 77.—Annual or rarely perennial, very variable in size and habit. Culms tufted, erect or decumbent at the base, slender, smooth, 2–4-noded, 6–24 in. high. Leaves shorter than the culms, very narrow and involute or broader and flat, $\frac{1}{12}$ – $\frac{1}{8}$ in. diam., almost glabrous or scaberulous on the margins and principal veins; sheaths smooth, grooved, the uppermost usually long; ligules long, narrow, membranous. Panicle 3–12 in. long, usually very lax and spreading when mature, but contracted in the young state; branches in distant whorls or clusters, the lowermost 2–6 in. long or more, repeatedly trichotomously divided, finely capillary, scabrid; pedicels very slender. Spikelets numerous, pale-green, $\frac{1}{12}$ – $\frac{1}{8}$ in. long. Two outer glumes subequal, lanceolate, acuminate, membranous, 1-nerved, keel scabrid; 3rd or flowering glume $\frac{1}{3}$ – $\frac{1}{2}$ shorter, oblong, truncate, minutely 4-denticulate, hyaline, more or less silky on the sides and with a tuft of hairs at the base; awn from the middle of the back, slender, straight or bent. Palea narrow-linear, bifid at the apex. Rhachilla usually produced behind the palea as a short silky bristle, but often very small and hardly perceptible.—*Hook. f. Fl. Nov. Zel.* i. 298; *Benth. Fl. Austral.* vii. 579. *Avena filiformis*, *Forst. Prodr.* n. 46. *Agrostis avenacea*, *Gmel. Syst.* i. 171. *A. Forsteri*, *Roem. and Schult. Syst.* ii. 359; *A. Rich. Fl. Nouv. Zel.* 131; *A. Cunn. Precur.* n. 253; *Raoul, Choix*, 39. *A. æmula*, *R. Br. Prodr.* 172; *Hook. f. Handb. N.Z. Fl.* 329; *Buch. N.Z. Grasses*, t. 21. *A. Solandri*, *F. Muell. Veg. Chath. Isl.* 60.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 3000 ft.

Var. *pilosa*, *Cheesem.* — Coarser and more robust. Leaves broader, $\frac{1}{4}$ – $\frac{1}{2}$ in. or even more, flat. Spikelets slightly larger.—*D. pilosa*, *Buch. Man.*

N.Z. Grasses, 6. *Agrostis pilosa*, A. Rich. Fl. Nouv. Zel. 134, t. 23; Raoul, Choix, 39; Hook. f. Fl. Nov. Zel. i. 297; Handb. N.Z. Fl. 329; Buch. N.Z. Grasses, t. 22.

NORTH AND SOUTH ISLANDS: Damp subalpine localities, not uncommon. Hardly more than a luxuriant state of the type.

Var. *semiglabra*, Hack. MS.—Flowering glume glabrous on the back, its callus sparingly pilose. Otherwise as in the type.

NORTH AND SOUTH ISLANDS: Not uncommon.

Var. *humilior*, Hack. MS.—Root often perennial. Culms 3–10 in. high. Panicle very broad and spreading; branches few, distant, binate, few-flowered. —A. *striata*, Col. in Trans. N.Z. Inst. xxi. (1889) 107.

NORTH AND SOUTH ISLANDS: Probably not uncommon in mountain districts, Lake Waikaremoana, Hill! Clarence Valley, Lake Tennyson, Broken River. Tasman Valley, &c., T. F. C.; Lake Te Anau, Petrie!

Var. *littoralis*, Hack. MS.—Root annual. Culms 2–9 in., often forming a compact sward. Panicle rather narrow, contracted, many-flowered. Empty glumes linear-lanceolate, narrower than in the type.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Rocky or gravelly places near the sea, not uncommon.

Var. *Lyallii*, Hack. MS.—Culms 6–12 in. Leaves narrow, involute. Panicle lax; branches few, binate or ternate. Spikelets larger, $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Flowering glume densely clothed with silky hairs.—A. *Lyallii*, Hook. f. Fl. Nov. Zel. i. 297.

SOUTH ISLAND: Near Westport, Townson! Okarito, A. Hamilton! Jackson's Bay, Kirk! Milford Sound, Lyall, Kirk! Catlin's River, Petrie! AUCKLAND ISLANDS: Kirk!

Var. *micrathera*, Hack. MS.—Habit of var. *Lyallii*, but larger and leaves broader. Spikelets still larger, $\frac{1}{3}$ – $\frac{1}{2}$ in. long. Empty glumes linear-lanceolate, acuminate. Flowering glume short, $\frac{1}{2}$ as long as the empty glumes, very thin, sparingly silky; awn from above the middle, short, delicate, hardly exerted beyond the empty glumes.

ANTIPODES ISLAND, CAMPBELL ISLAND: Kirk! Possibly the same as *Agrostis lentostachya*, Hook. f. Fl. Antarct. i. 94, but I have not seen an authenticated specimen, and it is described as having no palea and a long awn.

D. Forsteri is one of the most generally diffused plants in New Zealand, and is certainly one of the most variable. In attempting to characterize its chief forms, I have mainly followed the grouping suggested to me by Professor Hackel, who has kindly examined sets of all the varieties contained in my herbarium. The species is as plentiful in Australia and Tasmania as in New Zealand.

2. *D. Billardieri*, Kunth, Rev. Gram. i. 77.—Culms tufted, usually rather stout, erect or decumbent at the base, 9–18 in. high, leafy throughout. Leaves shorter than the culms, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, flat, striate, usually scabrid on the margins and veins; sheaths rather narrow, rough, the uppermost very long, usually enclosing the culm up to the base of the panicle; ligules long, membranous, lacerate. Panicle 4–12 in. long, very broad and lax, often as broad as long when fully expanded; branches numerous, in regular whorls, long, capillary, scabrid, trichotomously divided; pedicels thickened

at the tips. Spikelets $\frac{1}{5}$ – $\frac{1}{4}$ in. long, green or purplish. Two outer glumes slightly unequal, narrow-lanceolate, acuminate, 1-nerved or 3-nerved with the lateral veins very short, scabrid on the keel and sides; 3rd or flowering glume $\frac{1}{4}$ – $\frac{1}{3}$ shorter, oblong, truncate, silky at the base, 5-nerved, the 2 lateral nerves produced on each side into short awns, the 2 outer of which are longer than the 2 inner; dorsal awn from below the middle, straight or bent, usually exceeding the spikelet. Palea about $\frac{2}{3}$ as long as the flowering glume, linear, 2-nerved. Rhachilla produced into a silky bristle almost as long as the palea.—*Hook. f. Fl. Nov. Zel.* i. 298; *Benth. Fl. Austral.* vii. 580. *Agrostis* Billardieri, *R. Br. Prodr.* 171; *A. Rich. Fl. Nouv. Zel.* 130; *A. Cunn. Precur.* n. 252; *Raoul, Choix*, 39; *Hook. f. Handb. N.Z. Fl.* 329; *Buch. N.Z. Grasses*, t. 23.

Var. tenuis, *Petrie, MS.*—Smaller and much more slender. Leaves narrow, involute. Panicle smaller, with fewer branches. Spikelets rather smaller.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant throughout in rocky or sandy places near the sea. Inland at Te Aroha, Upper Thames Valley. **Var. tenuis**: Catlin's River, Otago, *H. J. Matthews*.

Easily distinguished from *D. Forsteri* by the stouter habit and broader leaves, large spikelets, and by the more glabrous flowering glume, the lateral nerves of which are excurrent as short awns. It is a common Australian and Tasmanian plant.

3. D. setifolia, *Hook. f. Fl. Nov. Zel.* i. 299, t. 65B.—Culms tufted, slender, wiry, smooth, 4–12 in. high. Leaves shorter than the culms, narrow, setaceous or filiform; sheaths smooth, striate, the uppermost long, tight; ligules oblong, membranous. Panicle erect, 1–2½ in. long, $\frac{1}{5}$ – $\frac{1}{3}$ in. broad, narrow, contracted; branches few, short, erect, scaberulous, sparingly divided. Spikelets few, pale-green, $\frac{1}{3}$ in. long; pedicels short, scabrid. Two outer glumes subequal, oblong-lanceolate, acuminate, firm, spreading, keeled, 1–3-nerved, the lateral nerves usually short, keel scabrid; 3rd or flowering glume $\frac{1}{4}$ – $\frac{1}{5}$ shorter, hard and almost coriaceous, silky at the base, the hairs almost as long as the glume, truncate and minutely 4-toothed at the tip; awn from the middle of the back, stout, scabrid, recurved, longer than the spikelet. Palea almost as long as the flowering glume, linear-oblong, 2-nerved. Rhachilla produced into a silky bristle half as long as the palea or more.—*Agrostis setifolia*, *Hook. f. Handb. N.Z. Fl.* 329; *Buch. N.Z. Grasses*, t. 24B.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in mountain districts from the East Cape and Mount Egmont southwards. 3000–5000 ft.

Allied to the following species, but a much smaller plant, panicle smaller and more slender, spikelets not much more than half the size, and flowering glume much more silky at the base and broadly truncate at the tip.

4. *D. avenoides*, *Buch. Man. N.Z. Grasses*, 6.—Culms tufted, erect, slender, rigid, smooth, 9–24 in. high. Leaves much shorter than the culms, narrow, in slender forms almost filiform, smooth, strongly involute; sheaths smooth, deeply grooved, the uppermost long; ligules short, broad. Panicle erect, 2–5 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, narrow, contracted, usually dense; branches short, erect, sparingly divided. Spikelets pale-green, $\frac{1}{5}$ – $\frac{1}{4}$ in. long; pedicels shorter than the spikelets. Two outer glumes subequal, lanceolate, acuminate, sharply keeled, rigid, 1- or rarely 3-nerved, keel scabrid, sides smooth or minutely rough; 3rd or flowering glume slightly shorter, hard, convolute, scabrid, slightly silky at the base, minutely 2–4-cuspidate; awn from below the middle, stout, recurved, twisted below the bend, longer than the spikelet. Palea almost as long as the flowering glume, linear, hyaline, 2-nerved. Rhachilla produced into a silky bristle nearly $\frac{1}{2}$ as long as the palea.—*Agrostis avenoides*, *Hook. f. Handb. N.Z. Fl.* 330; *Buch. N.Z. Grasses*, t. 24a.

Var. *brachyantha*, *Hack. MS.*—Culms taller and more slender, 1–3 ft. high. Leaves narrower, filiform, often strict and wiry. Spikelets smaller, about $\frac{1}{3}$ in. long; rhachilla shorter and more delicate.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Var. *brachyantha* common throughout, ranging from sea-level to 3500 ft., the typical state apparently confined to mountain districts in the South Island. Nelson—Wairau Gorge, *T. F. C.* Canterbury—Craigieburn Mountains, *Petrie!* Rangitata Valley, *Sinclair* and *Haast*; Tasman Valley, *T. F. C.* Otago—Not uncommon in upland districts, *Hector* and *Buchanan!* *Petrie!* *Cockayne!*

The typical state is well characterized by its large spikelets, which no doubt induced Hooker to give it the name of *avenoides*; but the var. *brachyantha* is an exceedingly puzzling form. Professor Hackel has no hesitation in placing it under *D. avenoides*, but most New Zealand botanists, including myself, have been accustomed to regard it as a state of *D. quadriseta*, to which it seems to show a very near approach, principally differing in the rather larger spikelets, with the rhachilla always produced at the back of the palea. It appears to me to be very much a matter of taste whether it should be placed under *D. avenoides* or *D. quadriseta*.

5. *D. Youngii*, *Buch. Man. N.Z. Grasses*, 6.—“Similar in habit to *A. avenoides*, but larger, 2–4 ft. high, more robust. Leaves flat, $\frac{1}{8}$ – $\frac{1}{4}$ in. diam. Panicle 4–6 in. long, very slender, flexuous; branches very short. Spikelets $\frac{1}{8}$ – $\frac{1}{4}$ in. long. Empty glumes oblong-lanceolate, acuminate, rigid, smooth, glabrous, nerveless; flowering glume as long, pedicelled, hard, scabrid, 2–4-cuspidate; awn very short, almost terminal. Palea as long as the glume; pedicel stout, with long silky hairs.”—*Agrostis Youngii*, *Hook. f. Handb. N.Z. Fl.* 330; *Buch. N.Z. Grasses*, t. 25.

SOUTH ISLAND: Canterbury—Dry hillsides, sources of the Waitaki River, *Haast*.

This is unknown to me, and I have therefore reproduced Hooker's description. It appears to differ from all forms of *D. avenoides* in the short "almost terminal" awn. Professor Hackel suggests that it may be a variety of *D. quadrisetata*, but the large spikelets and produced rhachilla hardly support such a view.

6. *D. quadrisetata*, Benth. *Fl. Austral.* vii. 581.—Culms tufted, erect, stout or slender, smooth or rather rough, 1–3 ft. high. Leaves much shorter than the culms, variable in width, sometimes $\frac{1}{8}$ in. broad and quite flat, at other times very narrow and setaceous or filiform, often involute, glabrous or minutely scaberulous; sheaths smooth or rough, grooved; ligules oblong, membranous. Panicle $1\frac{1}{2}$ –6 in. long, very narrow and spike-like, dense, cylindric, rarely broader and obscurely lobed, pale-green or brownish-green, shining; branches numerous, short, erect, branched from the base. Spikelets small, about $\frac{1}{8}$ in. long, shortly pedicelled. Two outer glumes subequal, lanceolate, acuminate, keeled, keel minutely scabrid, slightly hairy at the base, tip minutely but distinctly 4-awned; dorsal awn attached below the middle, sometimes almost basal, usually not much longer than the outer glumes. Palea almost as long as the flowering glume, narrow, 2-nerved. Rhachilla either not at all produced at the back of the palea or very obscurely so.—*Agrostis quadrisetata*, R. Br. *Prod.* 171; *Hook. f. Fl. Nov. Zel.* i. 296; *Handb. N.Z. Fl.* 330; *Buch. N.Z. Grasses*, t. 26. *Avena quadrisetata*, Labill. *Pl. Nov. Holl.* i. 25, t. 32.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon throughout. Sea-level to 2500 ft.

Also abundant in Australia and Tasmania. The rhachilla is seldom produced at the back of the palea, so that the plant technically falls into *Agrostis*. But it is so closely allied to *D. avenoides*, which is an undoubted *Deyeuxia*, that I have decided to leave it in that genus.

7. *D. Petriei*, Hack. in *Trans. N.Z. Inst.* xxxv. (1903) 380 (*sub* Calamagrostis).—Culms slender, erect, terete, 1–3 ft. high, glabrous, 3-noded, uppermost node near the middle of the culm. Leaves much shorter than the culms, about $\frac{1}{8}$ in. broad, flat, rather flaccid, smooth or scaberulous on the upper surface; sheaths terete, close, scaberulous; ligules oblong, obtuse. Panicle 3–6 in. long, narrow but not very dense; rhachis smooth; branches short, binate or ternate, the lowermost often distant, short, erect, sparingly divided; pedicels shorter than the spikelets, smooth. Spikelets $\frac{1}{4}$ – $\frac{1}{3}$ in. long, pale-green. Two outer glumes subequal, narrow-lanceolate, acute, rigidly membranous, 1-nerved, scabrid on the keel; 3rd or flowering glume about $\frac{1}{8}$ shorter, lanceolate, subacute, minutely denticulate at the tip, firm but membranous, scabro-punctate on the back, callus with silky hairs $\frac{1}{3}$ the length of the glume; awn inserted about the middle of the back, straight, equalling the empty glumes or rarely exceeding them. Palea almost as long as the flowering glume,

linear, bidentate. Rhachilla produced into a hairy bristle at the back of the palea, about $\frac{1}{3}$ its length.—*D. scabra*, *Buch. N.Z. Grasses*, t. 26A (*not of Benth.*).

SOUTH ISLAND: Otago—Swampy Hill (near Dunedin), Mount Pisa, *Petrie!* 1500–3500 ft.

This was referred by Mr. Buchanan to *D. scabra*, *Benth.* (*Agrostis scabra*, R. Br.; *Hook. f. Fl. Tasm.* ii. 116, t. 160), which differs from the New Zealand plant, as indicated by Professor Hackel, in the small spikelets; scabrid branches of the panicle; in the flowering glume being almost as long as the empty ones, much more coriaceous and obtuse, and with fewer shorter hairs on the callus; in the very short awn inserted far above the middle of the back of the glume; and in the process of the rhachilla being shorter and less hairy.

19. **DICHELACHNE**, Endl.

Tall slender grasses. Leaves narrow, flat or convolute. Spikelets 1-flowered, numerous, arranged in long and narrow usually dense panicles; rhachilla disarticulating above the 2 outer glumes, very slightly or not at all produced beyond the flower. Glumes 3; 2 outer subequal or slightly unequal, empty, persistent, narrow, sharply acuminate, keeled, membranous; 3rd or flowering glume almost as long, keeled, entire or shortly 2-fid, furnished with a long flexuous awn inserted on the back just below the tip, base of the glume with a hairy callus. Palea slightly shorter than the glume, narrow, 2-nerved. Stamens 2–3. Styles short, distinct; stigmas plumose. Grain narrow, enclosed in the slightly hardened flowering glume and palea.

The genus is confined to the two following species, both of which extend to Australia and Tasmania.

Panicle dense.	Spikelets $\frac{1}{2}$ in.	Awn 1 in., not twisted at the base	1. <i>D. crinita</i> .
Panicle lax.	Spikelets $\frac{1}{4}$ in.	Awn $\frac{1}{2}$ – $\frac{3}{4}$ in., usually twisted at the base	2. <i>D. sciurea</i> .

1. ***D. crinita***, *Hook. f. Fl. Nov. Zel.* i. 293.—Annual. Culms tufted, tall, slender, erect, 2–3 ft. high, leafy at the base. Leaves much shorter than the culms, flat or convolute, glabrous or the lower ones sometimes softly pubescent; margins smooth or slightly scaberulous; sheaths grooved, the upper rather long; ligules short, broad. Panicle very dense and spike-like, 3–6 in. long or more, bristling with the numerous awns which almost conceal the spikelets, pale-green, shining; branches numerous, short, erect. Spikelets $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Two outer glumes more or less unequal, very narrow, long-acuminate, membranous or hyaline, keel green and scabrous; 3rd or flowering glume distinctly shorter, convolute, smooth or slightly rough, produced into a hyaline entire or 2-fid tip; awn very long, about 1 in., straight or flexuous, not twisted at the base. Palea about $\frac{1}{4}$ shorter than the flowering glume, linear, 2-nerved.—*Handb. N.Z. Fl.* 326; *Fl. Tasm.* ii. 111; *Benth.*

Fl. Austral. vii. 574; *Buch. N.Z. Grasses*, t. 15. *D. Hookeriana* and *D. Forsteriana*, *Trin. and Rupr. in Mem. Acad. Petersb. Sér.* vi. 5 (1842), 3, 4. *Agrostis crinita*, *R. Br. Prodr.* 170; *A. Rich. Fl. Nouv. Zel.* 136; *A. Cunn. Precur.* n. 246; *Raoul, Choix*, 39. *Anthoxanthum crinitum*, *Forst. Prodr.* n. 18.

Var. **intermedia**, *Hack. MSS.*—Rather more slender; panicle narrower and laxer. A passage form into *D. sciurea*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Plentiful in dry open situations throughout. Sea-level to 3000 ft. Also abundant in Australia and Tasmania.

2. ***D. sciurea***, *Hook. f. Fl. Nov. Zel.* i. 294.—Smaller than *D. crinita* and more slender. Culms tufted, 1–2 ft. high, slender, quite glabrous. Leaves chiefly at the base of the culms and much shorter than them, narrow, flat or convolute, sometimes almost setaceous, glabrous or the lower ones pubescent; sheaths smooth; ligules short, broad. Panicle 3–6 in. long, much more lax and open than in *D. crinita*; branches slender, capillary, scabrid. Spikelets $\frac{1}{4}$ in. long, rarely more. Two outer glumes equal or nearly so, long-acuminate, margins hyaline, keel smooth or scabrid; 3rd or flowering glume nearly as long, convolute, smooth or slightly scabrous, entire or 2-fid at the tip; awn $\frac{1}{2}$ – $\frac{3}{4}$ in. long, flexuous, usually but not invariably twisted at the base, inserted on the back of the glume close to the tip. Palea narrow-linear, 2-fid.—*Handb. N.Z. Fl.* 326; *Fl. Tasm.* ii. 111, t. 158A; *Benth. Fl. Austral.* vii. 574; *Buch. N.Z. Grasses*, t. xvi. (*in part*). *D. Sieberiana*, *Trin. and Rupr. in Mem. Acad. Petersb. Sér.* vi. 5 (1842) 2. *D. montana*, *Endl. Prodr. Fl. Ins. Norf.* 24. *Agrostis sciurea*, *R. Br. Prodr.* 171. *Stipa micrantha*, *Cav. Ic.* v. 42; *F. Muell. in Journ. Bot.* (1878) 327 (*not of Benth. Fl. Austral.* vii. 566).

Var. **inæquiglumis**, *Hack. MSS.*—Panicle with longer flaccid branches; spikelets more laxly arranged. Two outer glumes unequal, acute but not cuspidate, keel sharply scabrid; awn of flowering glume almost apical, not twisted at the base.

NORTH ISLAND: From the North Cape to Wellington; not so plentiful as *D. crinita*. SOUTH ISLAND: Has been recorded from Marlborough (*Buchanan*), Canterbury (*Armstrong*), and Greymouth (*Kirk*), but I have seen no specimens.

Also in Australia, Tasmania, and Norfolk Island.

20. **DESCHAMPSIA**, Beauv.

Perennial grasses. Leaves narrow, flat or convolute. Spikelets rather small, 2-flowered, arranged in lax or contracted panicles; rhachilla disarticulating above the 2 outer glumes, produced between the flowering glumes and above the upper flower as a naked or hairy bristle, rarely ending in an imperfect flower. Glumes 4; 2 outer slightly unequal, persistent, empty, keeled, acute, membranous, shining; 3rd and 4th (or flowering glumes) membranous or

almost hyaline, toothed at the apex; dorsal awn slender, twisted at the base, sometimes very small or wanting. Palea narrow, 2-nerved. Lodicules 2, ovate. Stamens 3. Styles distinct; stigmas plumose. Grain oblong, enclosed within the unaltered flowering glume and palea.

Species about 25, dispersed through most cold or temperate regions. One of the New Zealand species extends through the whole range of the genus; the remaining 6 are endemic. These constitute a somewhat anomalous group, differing from the true *Deschampsia* in the awn being almost terminal and very small, or altogether absent. They may ultimately form a separate genus.

* Awn from the middle of the back of the flowering glume or below it.

Tall, 1-4 ft. high. Panicle long, 4-12 in. Spikelets $\frac{1}{2}$ - $\frac{1}{4}$ in. 1. *D. cæspitosa*.

** Awn from immediately below the tip of the flowering glume or wanting.

† *Rhachilla glabrous*.

Forming dense patches $\frac{1}{2}$ -1 $\frac{1}{2}$ in. high. Leaves short, curved. Panicle $\frac{1}{4}$ - $\frac{3}{4}$ in., dense. Spikelets straw-yellow, shining. Awn wanting or rarely present 2. *D. pusilla*.

Slender, 3-9 in. Leaves shorter than the culms, involute. Panicle slender, lax, 1-3 in. long. Spikelets pale-green, apex of flowering glume irregularly denticulate. Awn wanting 3. *D. novæ-zealandiæ*.

Slender, 6-18 in. Leaves flaccid, flat or involute, often capillary. Panicle very slender, 3-6 in. Spikelets $\frac{1}{10}$ - $\frac{1}{8}$ in., pale-green; apex of flowering glume 3-toothed. Awn usually present 4. *D. Chapmani*.

†† *Rhachilla hairy*.

Very slender, flaccid, 6-14 in. Leaves capillary. Panicle very slender, lax, 2-6 in. Spikelets small, $\frac{1}{10}$ in.; apex of flowering glume 3-toothed. Awn usually present .. 5. *D. tenella*.

Slender, tufted, 2-8 in. Leaves short, strict. Panicle lax, deltoid, $\frac{3}{4}$ -2 in. Spikelets few, $\frac{1}{8}$ - $\frac{1}{6}$ in.; apex of flowering glume 3-toothed. Awn usually present. Hairs of rhachilla long, copious 6. *D. gracillima*.

Slender, 3-6 in. Leaves short, flat. Panicle sparingly branched, lax, 1-2 in.; spikelets few. Flowering glume irregularly denticulate; awn wanting. Rhachilla with a minute empty glume at the apex 7. *D. penicillata*.

1. *D. cæspitosa*, Beauv. *Agrost.* 91, t. 18, f. 3.—Culms densely tufted, forming large tussocks, smooth, shining, rather stout or slender, leafy, 1-4 ft. high. Leaves rather stiff, narrow, flat or convolute, rough on the upper surface and margins; sheaths shining, smooth or rough; ligules long, membranous, acute. Panicles 4-12 in. long, usually rather narrow and dense in New Zealand examples, inclined or nodding above; branches in somewhat distant fascicles, capillary, smooth or minutely scaberulous. Spikelets $\frac{1}{5}$ - $\frac{1}{4}$ in. long, shining, pale yellow-green or purplish. Two outer glumes keeled, acute or subacute, 1-nerved or the upper

3-nerved; 3rd and 4th or flowering glumes equalling the empty glumes or rarely exceeding them, truncate, 4-toothed, silky at the base, the 4th separated from the 3rd by a distinct hairy internode, sometimes absent so that the spikelet becomes 1-flowered; awn from the middle of the back or below it, not twisted at the base or obscurely so, usually not far exceeding its glume. Rhachilla produced into a distinct hairy pedicel above the 4th glume.—*Hook. f. Fl. Nov. Zel.* i. 301; *Fl. Tasm.* ii. 118; *Handb. N.Z. Fl.* 334; *Benth. Fl. Austral.* vii. 587; *Buch. N.Z. Grasses*, t. 37. *Aira cæspitosa*, *Linn. Sp. Plant.* 64. *A. Kingii*, *Hook. f. Fl. Antarct.* ii. 376, t. 135. *A. australis*, *Raoul, Choix*, 12. *Agrostis aucklandica*, *Hook. f. Fl. Antarct.* i. 96.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Wet places from the Lower Waikato southwards, plentiful. Sea-level to 3500 ft.

An abundant grass in all cool and temperate regions. The New Zealand form has the spikelets rather larger and the awn of the flowering glume inserted somewhat higher up than is usual in northern specimens, and is distinguished as *var. macrantha* by Hackel.

2. *D. pusilla*, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 403.—Culms densely tufted, branched at the base, 1–2 in. high, forming small compact patches. Leaves numerous, shorter than the culms, setaceous, curved, convolute; sheaths broad, membranous, grooved; ligules large for the size of the plant, acute, much broader than the blade, decurrent along the margins of the sheath. Panicle small, contracted, sometimes almost spiciform, straw-yellow, shining, $\frac{1}{4}$ – $\frac{3}{4}$ in. long; branches few, short, small, the lowermost bearing 2–3 spikelets, the upper 1 only. Spikelets $\frac{1}{2}$ in. long, 2-flowered, rarely 3-flowered. Two outer glumes almost equal in length, hyaline, the lower narrower, 1-nerved, the 2nd 3-nerved; 3rd and 4th or flowering glumes faintly silky or almost glabrous at the base, broadly oblong, hyaline, indistinctly 5-nerved, truncate, irregularly 3-toothed or erose, awnless or with a minute dorsal awn inserted just below the tip. Palea as long as the glume, deeply bifid, 2-nerved. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a short bristle, quite glabrous.

SOUTH ISLAND: Otago—Hector Mountains, *Petrie*! Humboldt Mountains, *Cockayne*! 5000–6500 ft.

A very remarkable little plant, quite distinct from any of the following species.

3. *D. novæ-zealandiæ*, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 402.—Culms densely tufted, branched at the base, slender, smooth, leafy below, 3–9 in. high, rarely more. Leaves from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the culms, very narrow, setaceous, involute; sheaths

broad, pale, membranous, grooved; ligules long, scarious, acute, broader than the blade at the base. Panicle slender, erect, 1-3 in. long, usually lax but sometimes contracted; branches few, capillary, smooth or minutely scaberulous, sparingly divided. Spikelets few, small, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, pale-green, shining, 2-flowered. Two outer glumes unequal, the lower about $\frac{1}{2}$ the length of the spikelet, oblong-lanceolate, acute, 1-nerved, the upper about $\frac{2}{3}$ the length of the spikelet, broader and more obtuse, 3-nerved; 3rd and 4th or flowering glumes broadly oblong, hyaline, membranous, faintly 3-5-nerved, quite glabrous at the base, broadly truncate at the apex and irregularly minutely denticulate, awn wanting. Palea bifid, 2-nerved, nerves faintly ciliate. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a slender bristle, quite glabrous.—*D. Hookeri*, *Kirk in Journ. Bot.* xxiv. (1891) 237 (*in part*).

SOUTH ISLAND: Canterbury—Lake Lyndon, *Petrie!* Castle Hill, *Kirk!* Poulter River, *Cockayne*. Westland—Kelly's Hill, *Petrie!* *Cockayne!* Otago—Naseby, Pembroke, Mount St. Bathans, Hector Mountains, Lake Te Anau, *Petrie!* 1000-5000 ft.

Although very closely allied to *D. Chapmani* and *D. tenella* this appears to be sufficiently distinct from both in the irregularly denticulate apex of the flowering glume and the total absence of the dorsal awn. Mr. Kirk united all three under the name of *D. Hookeri*.

4. *D. Chapmani*, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 401.—Culms tufted, branched at the base, quite smooth, leafy, 6-18 in. high. Leaves longer or shorter than the culms, very narrow, flat or involute, often almost filiform, flaccid; sheaths long, narrow, deeply grooved; ligules elongated, acute, broader than the blade at the base. Panicle very slender, 3-6 in. long or more, effuse or contracted, laxly and sparingly branched; branches capillary, minutely scaberulous, usually trichotomously divided. Spikelets few, small, about $\frac{1}{8}$ in. long, pale-green, glistening, 2-flowered. Two outer glumes unequal, much shorter than the spikelet, oblong-lanceolate, membranous, the lower short, 1-nerved, the upper $\frac{1}{2}$ longer, equalling the lower flower or slightly exceeding it, 3-nerved; 3rd and 4th or flowering glumes broadly oblong, membranous, faintly 3-5-nerved, glabrous at the base or rarely with few very short hairs, truncate at the apex and more or less irregularly 3-5-toothed; awn usually present on both glumes, from the back a little distance below the tip. Palea bifid, 2-nerved, nerves ciliate. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a slender bristle, quite glabrous.—*D. Hookeri*, *Kirk in Journ. Bot.* xxiv. (1891) 237 (*in part*). *Catabrosa antarctica*, *Hook. f. Fl. Antarct.* i. 102, t. 56. *Triodia antarctica*, *Benth. in Journ. Linn. Soc.* xix. (1881) 111.

SOUTH ISLAND: Canterbury—Arthur's Pass, *Kirk!* Otago—Clinton Saddle, *Petrie!* Milford Sound, *Kirk!* AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: *Hooker*, *Kirk!* Sea-level to 3500 ft.

Very close to the following species, of which it may prove to be a variety, and from it is mainly separated by the glabrous rhachilla and rather larger spikelets.

5. *D. tenella*, *Petrie in Trans. N.Z. Inst.* xxiii. (1891) 402.—Culms tufted, branched at the base, extremely slender, flaccid, quite smooth, leafy throughout, 6–14 in. high. Leaves bright-green, very narrow, capillary, involute, flaccid, the uppermost often exceeding the young panicle; sheaths smooth, grooved; ligules long, acute, membranous, broader than the blade and decurrent along the margins of the sheaths. Panicle very slender, 2–6 in. long, contracted at first, but becoming lax and somewhat effuse; branches in pairs, few, rather distant, capillary, scabrid, trichotomously divided. Spikelets few towards the tips of the branches, small, $\frac{1}{10}$ in. long, pale, glistening, 2-flowered. Two outer glumes unequal, much shorter than the spikelet, membranous, 1-nerved or the upper 3-nerved; 3rd and 4th or flowering glumes broadly oblong, delicately hyaline, faintly 5-nerved, silky at the base, truncate at the apex and 3-toothed, the middle tooth often bifid, the 4th always with a minute dorsal awn inserted just below the apex, the 3rd frequently awnless. Palea bifid, 2-nerved, the nerve finely ciliate. Rhachilla elongated between the flowering glumes and more or less silky, produced above the upper flower into a silky bristle.—*D. Hookeri*, *T. Kirk in Journ. Bot.* xxiv. (1891) 237 (*in part*). *Catabrosa antarctica*, *Hook. f. Fl. Nov. Zel.* i. 308 (*but not of Fl. Antarct.* i. 102); *Buch. N.Z. Grasses*, t. 41B.

NORTH ISLAND: Ruahine Mountains, *Colenso*! Tararua Mountains, *H. H. Travers*! SOUTH ISLAND: Nelson—Mount Arthur, *A. McKay*! Otago—Near Dunedin, Catlin's River, Clinton Saddle, *Petrie*! Sea-level to 4500 ft.

This differs from both *D. novæ-zealandiæ* and *D. Chapmani* in the silky rhachilla, and from the former in addition in the dorsal awn being present in at least the upper flower. It varies greatly in the size of the spikelets and in the proportionate length of the outer glumes. Mr. Petrie's original specimens from Catlin's River have the spikelets barely more than $\frac{1}{2}$ in. long, and the upper outer glume is not half the length of the spikelet; but those from the Clinton Valley, and Mr. Colenso's from the Ruahine Range, have much larger spikelets with longer outer glumes.

6. *D. gracillima*, *T. Kirk in Journ. Bot.* xxiv. (1891) 237.—Culms tufted, usually with intravaginal branches near the base, erect, slender, glabrous, 2–8 in. high. Leaves towards the base of the culms and much shorter than them, strict, erect, very narrow, setaceous or filiform, convolute; sheaths rather lax, grooved; ligules long, membranous, usually split at the tip. Panicle erect, ovate or deltoid, open, $\frac{3}{4}$ –2 in. long; branches few, binate, capillary, smooth or almost so. Spikelets $\frac{1}{8}$ – $\frac{1}{6}$ in. long, on pedicels longer than themselves, 2-flowered. Two outer glumes unequal, 3-nerved, shorter than the spikelet; 3rd and 4th or flowering glumes densely

silky at the base, oblong, membranous, 5-nerved, truncate at the tip and 3-toothed, the middle tooth entire or bifid or irregularly erose, the 3rd awnless or very obscurely awned, the 4th usually with a minute dorsal awn inserted just below the tip. Palea linear-oblong, bifid, 2-nerved, nerves finely ciliate. Rhachilla elongated between the flowering glumes and densely silky, produced above the upper flower into a long silky bristle.

AUCKLAND ISLANDS: Carnley Harbour, altitude 1000 ft., *Kirk*!

The densely tufted habit, short strict erect leaves, deltoid few-flowered panicle, large spikelets, and densely hairy rhachilla distinguish this from all its allies.

7. *D. penicillata*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 354.—Culms tufted, slender, glabrous, leafy, 3–6 in. high. Leaves shorter than the culms, radical and cauline; blades short, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, narrow, flat or involute, striate; sheaths pale, membranous, deeply grooved, the uppermost long, enclosing the culm up to the base of the panicle; ligules long, pointed, scarious, broader than the blade at the base. Panicle small, 1–2 in. long, few-flowered; branches few, capillary, the lower ones bearing 2–3 spikelets, the upper 1-spiculate. Spikelets $\frac{1}{8}$ – $\frac{1}{6}$ in. long, pale yellow-green, shining, 2-flowered. Two outer glumes almost equalling the flowering glumes, subequal, oblong-lanceolate, subacute, hyaline, 3-nerved; 3rd and 4th or flowering glumes oblong, very delicate, with white hyaline tips, 5-nerved, silky at the base, obtuse or almost truncate at the tip and irregularly minutely denticulate, awn wanting. Palea linear-oblong, 2-nerved, nerves silky. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a bristle bearing a minute empty glume at its summit, silky throughout.

MACQUARIE ISLAND: In swamps, *A. Hamilton*!

I regret that I have only seen two small and immature specimens of this curious little plant, which is by no means closely related to any other New Zealand species.

21. *TRISETUM*, Pers.

Perennial or rarely annual grasses. Leaves flat. Spikelets rather small, usually 2-flowered, more rarely 3–6-flowered, arranged in a narrow dense or lax panicle; rhachilla disarticulating above the 2 outer glumes, more or less produced between the flowering glumes and beyond the upper flower into a short bristle. Two outer glumes persistent, empty, equal or unequal, acute, keeled, 1–3-nerved. Flowering glumes 2–3, rarely more, equalling or exceeding the empty glumes, membranous with broad hyaline margins, 2-toothed at the apex, the teeth often produced into bristles or short awns; dorsal awn from the back below the tip, slender, straight or bent, often twisted

at the base. Palea strongly 2-nerved, 2-toothed. Stamens 3. Styles very short, distinct; stigmas plumose. Grain enclosed within the flowering glume and palea, free.

A genus of about 60 species, most plentiful in the north temperate zone, but also found on the high mountains of the tropics and in South America and Australasia. One of the New Zealand species is widely spread, the rest are endemic.

* Awn at least as long as the glume, inserted on the back a little distance below the tip.

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| Glabrous or sparsely pubescent, 6-24 in. Panicle 2-10 in., rather lax. Empty glumes lanceolate, unequal .. | 1. <i>T. antarcticum</i> . |
| Pilose, 2-3 ft. Panicle 2-10 in., very slender. Empty glumes oblong or oblong-obovate, subequal .. | 2. <i>T. Youngii</i> . |
| Puberulous or tomentose, 2-12 in. Panicle dense, cylindric, $\frac{1}{2}$ -2 in. | 3. <i>T. subspicatum</i> . |

** Awn very short, from between the terminal teeth of the glume.

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| Puberulous, 6-12 in. Panicle dense, cylindric, 1-3 in. Teeth of flowering glumes short | 4. <i>T. Cheesemanii</i> . |
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1. ***T. antarcticum***, *Trin. in Mém. Acad. Petersb. Sér. vi. 1* (1831) 61.—Perennial, very variable in size and degree of robustness. Culms tufted, slender, smooth or sparsely pubescent, 6-24 in. high. Leaves usually shorter than the culms, narrow, $\frac{1}{5}$ - $\frac{1}{6}$ in. broad, flat or involute, flaccid, smooth or the margins finely scaberulous; sheaths long, narrow, grooved; ligules short, truncate, hyaline, ciliate. Panicle very variable, erect or inclined, contracted or rather lax, usually narrow, rarely broad and effuse, 1-10 in. long; branches short, slender, suberect, simple or again divided. Spikelets compressed, pale-green or brownish-green, shining, 2-3-flowered, rarely 1-flowered or 4-flowered, $\frac{1}{5}$ - $\frac{1}{4}$ in. long. Two outer glumes unequal, the lower from less than $\frac{1}{2}$ to $\frac{2}{3}$ the length of the upper, lanceolate, acute, scabrid on the keel; margins broad, hyaline. Flowering glumes exceeding the empty glumes, oblong-lanceolate, 2-cuspidate at the apex, scabrous-pubescent on the back, margins hyaline; awn from the back a little distance from the tip, sometimes $\frac{1}{4}$ -way down, not twisted, recurved, twice as long as the glume. Palea almost as long as the flowering glume. Rhachilla clothed with copious long silky hairs between the flowering glumes, produced beyond the upper flower into a silky bristle.—*Hook. f. Fl. Nov. Zel. i. 301, t. 68B; Handb. N.Z. Fl. 335; Buch. N.Z. Grasses, t. 39. Avena antarctica, Forst. Prodr. n. 41. Avena antarctica, Roem. and Schult. Syst. ii. 676; A. Rich. Fl. Nouv. Zel. 139; A. Cunn. Precur. n. 257; Raoul, Choix, 39. Danthonia pallida, A. Cunn. Precur. n. 256 (not of R. Br.).*

Var. ***lasiorhachis***, *Hack. MSS.*—Culms, leaf-sheaths, rhachis, and branches of the panicle densely pubescent. Other characters as in the type.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 4500 ft.

2. **T. Youngii**, *Hook. f. Handb. N.Z. Fl.* 335.—Culms tufted, slender, erect, pilose or glabrous, 1–3 ft. high. Leaves mostly at the base of the culms and much shorter than them, $\frac{1}{2}$ – $\frac{1}{4}$ in. broad, flat, smooth, pilose with long soft hairs; sheaths grooved, glabrous or pilose; ligules short, truncate, lacerate, hyaline. Panicle slender, very narrow, 2–8 in. long; rhachis pilose; branches short, close, suberect, few-flowered, also pilose. Spikelets compressed, pale-green or yellow-brown, shining, 1–3-flowered, about $\frac{1}{5}$ in. long. Two outer glumes almost as long as the flowering glumes, subequal or the lower about $\frac{1}{4}$ shorter than the upper, oblong or oblong-obovate, suddenly acuminate, membranous, scabrid along the keel. Flowering glumes oblong-lanceolate, shortly 2-cuspidate, minutely rough on the back; awn from $\frac{1}{5}$ to $\frac{1}{4}$ way down the back, rather stout, recurved, nearly as long again as the glume. Palea almost equalling the flowering glume. Rhachilla nearly glabrous, produced between the flowering glumes and above the upper flower.—*Buch. N.Z. Grasses*, t. 40B.

NORTH ISLAND: Mount Hikurangi, *Adams and Petrie!* Tararua Range, *Buchanan!* SOUTH ISLAND: Not uncommon in subalpine localities, especially on the western side. 3000–5000 ft.

Best distinguished from *T. antarcticum* by the much broader oblong or oblong-obovate empty glumes; but it is usually a taller and more pilose plant, with a narrower panicle.

3. **T. subspicatum**, *Beauv. Agrost.* 88.—Culms densely tufted, stout or slender, pubescent or tomentose, in New Zealand specimens from 2 to 12 in. high, rarely more. Leaves numerous at the base of the culms and much shorter than them, firm, erect, rather strict, flat, more or less downy or almost glabrous, $\frac{1}{2}$ – $\frac{1}{8}$ in. broad; sheaths rather lax, deeply grooved; ligules short, scarious, lacerate. Panicle short and dense, cylindric or almost ovoid, rarely slightly lobed or interrupted at the base, $\frac{1}{2}$ –2 in. long; rhachis densely tomentose; branches short, erect. Spikelets compressed, whitish or yellowish-green, rarely purplish, shining, 2–3-flowered, $\frac{1}{6}$ – $\frac{1}{4}$ in. long. Two outer glumes unequal, lanceolate, keeled, scabrid along the keel, the outer 1-nerved, the 2nd 3-nerved. Flowering glumes oblong-lanceolate, 2-cuspidate or shortly 2-awned at the tip, hairy at the base, keel scabrid above, sides minutely rough; awn from $\frac{1}{6}$ to $\frac{1}{4}$ way down the back, longer than the glume, straight or recurved. Palea about $\frac{1}{5}$ shorter than the flowering glume, 2-nerved, scabrid along the nerves.—*Hook. f. Fl. Antarct.* i. 97; *Handb. N.Z. Fl.* 335; *Benth. Fl. Austral.* vii. 588; *Buch. N.Z. Grasses*, t. 40A.

SOUTH ISLAND: Not uncommon in alpine and subalpine localities throughout. AUCKLAND ISLANDS: *Kirk!* CAMPBELL ISLAND: *Sir J. D. Hooker!* Usually from 3500 to 5500 ft., but descends almost to sea-level in the Auckland Islands.

A common alpine grass in most countries, extending into both arctic and antarctic regions.

4. **T. Cheeseemanii**, *Hack. in Trans. N.Z. Inst.* xxxv. (1903) 381.—Culms rather stout, erect, 3–12 in. high, naked and puberulous above, leafy below, 2-noded, the upper node in the lower $\frac{1}{4}$ of the culm. Leaves crowded at the base of the culms, flat, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad, firm, erect, glaucous, finely scaberulous on the veins and margins; sheaths rather lax, subcompressed, minutely puberulous; ligules short, truncate, denticulate. Panicle very dense, cylindrical, 1–2 $\frac{1}{2}$ in. long, $\frac{1}{2}$ in. broad; rhachis tomentose; branches densely imbricate, short, binate or ternate. Spikelets elliptic-lanceolate, compressed, whitish-yellow, shining, 2-flowered, about $\frac{1}{4}$ in. long. Two outer glumes slightly unequal, lanceolate, acute, scabrid on the keel, minutely rough on the sides, the lower 1-nerved, the 2nd 3-nerved. Flowering glumes lanceolate, very shortly 2-cuspidate, slightly hairy at the base, minutely rough, faintly 5-nerved; awn very short indeed, from between the terminal teeth or just below them. Palea $\frac{1}{4}$ shorter than the glume, scabrid along the nerves. Rhachilla produced between the flowering glumes and beyond the upper flower, silky.

NORTH ISLAND: Mount Hikurangi, *Petrie*! SOUTH ISLAND: Canterbury—Craigieburn Mountains, *Petrie*! *Cockayne*! Hooker Glacier, *T. F. C.* Otago—*Petrie*! 3000–5000 ft.

This has much of the habit and appearance of *T. subspicatum*, but differs from it, and from all the other species, in the very shortly bidentate flowering glume, with the intermediate awn springing almost from between the teeth, not from the back some distance below the teeth, as is usual in the genus.

22. AMPHIBROMUS, Nees.

Slender glabrous grasses. Leaves flat. Spikelets 5–10-flowered, arranged in a lax panicle; rhachilla slender, hairy, jointed between the flowers. Two outer glumes persistent, empty, acute, keeled, 5-nerved at the base, with scarious margins, awnless. Flowering glumes more rigid, rounded on the back, prominently 5-nerved, often split at the tip with the lobes produced into short awns; dorsal awn from about the middle of the back, straight or bent, often twisted. Palea thin, 2-toothed. Stamens 3. Styles short, distinct; stigmas plumose. Lodicules 2. Grain oblong, glabrous, enclosed within the flowering glume and palea.

A small genus of 2 species, the present one and another endemic in Australia.

1. **A. fluitans**, *T. Kirk in Trans. N.Z. Inst.* xvi. (1884) 374, t. 28.—Culms weak, branched, creeping and rooting at the base, erect or floating above, glabrous, 12–18 in. long. Leaves numerous, sheathing the culm up to the base of the panicle, narrow, flat, minutely scabrid on the margins and veins; sheaths rather broad and lax, compressed, grooved, longer than the internodes; ligules long, pointed, hyaline. Panicle 2–4 in. long, narrow, lax, few-

flowered; branches few, short, capillary, scaberulous, the lowermost with 2-3 spikelets, the upper 1-spiculate. Spikelets compressed, pale-green, usually about $\frac{1}{2}$ in. long without the awns, 4-7-flowered. Two outer glumes unequal, small, the upper not one-half the length of the flowering glume above it. Flowering glumes silky at the base, firm and rather rigid when in fruit, 5-7-nerved, scabrous on the back and sides; awn from the middle of the back, long, straight, scabrid, not bent nor twisted. Palea hyaline, 2-nerved, strongly ciliate on the nerves.

NORTH ISLAND: Auckland—Marshes near Waiuku, *Curse!* Lakes Whangape and Waikare, *T. F. C.*; Lake Waihi, *Kirk!* Taranaki—Swamps near New Plymouth, *T. F. C.*

Distinguished from the Australian *A. Neesii* by the weak decumbent habit, smaller panicle, narrower spikelets, shorter outer glumes, and straight awn.

23. DANTHONIA, D.C.

Perennial or rarely annual grasses. Leaves very variable. Spikelets 3- to many-flowered, laterally compressed, arranged in a lax or dense panicle, rarely in a simple raceme; rachilla disarticulating above the 2 outer glumes and between the flowering glumes, produced beyond the uppermost flower. Two outer glumes persistent, empty, equal or more or less unequal, keeled, acute or acuminate, 3-7-nerved, as long as the whole spikelet or slightly shorter. Flowering glumes 2 or more, rounded on the back, usually ciliate on the margins, 5-9-nerved, hairy, the hairs often collected into variously arranged tufts, 2-lobed at the tip, the lobes often produced into short awn-like bristles; awn from the sinus between the lobes, usually long and rigid and twisted, rarely reduced to a mucro; callus at the base of the glume, hairy. Palea broad, hyaline, 2-keeled. Lodicules 2. Stamens 3. Styles distinct; stigmas plumose. Grain oblong, ellipsoid, or obovoid, free within the flowering glume and palea.

Species not far from 100, widely dispersed in both hemispheres, but chiefly in the south temperate zone, particularly abundant in Australia, New Zealand, and South Africa. Of the 13 species found in New Zealand, 2 extend to Australia, the rest are endemic.

* Two outer glumes shorter than the spikelet, very rarely almost equaling it.

† Culms tall, stout. Panicle large; spikelets numerous.

Culms 2-5 ft. Leaves $\frac{1}{4}$ - $\frac{3}{4}$ in., often pilose. Panicle 6-18 in., lax. Awn straight, not flattened nor twisted at the base 1. *D. Cunninghamii*.

Culms $1\frac{1}{2}$ -2 ft. Leaves pilose. Panicle 3-4 in., lax. Flowering glume with separate tufts of hairs on the margins and back 2. *D. ovata*.

- Culms 1-4 ft. Leaves involute. Panicle 4-6 in., ovate, dense. Awn seldom twisted 3. *D. bromoides*.
 Culms 2-5 ft. Leaves involute. Panicle 4-18 in., lax. Awn flattened and twisted at the base 4. *D. Raoulii*.

†† Culms shorter, 6-18 in. Panicle small, 1-3 in. long; spikelets few, 3-12.

- Culms 6-18 in. Leaves involute, compressed. Spikelets 8-12. Nerves of flowering glume connected by transverse veinlets 5. *D. crassiuscula*.
 Culms 2-6 in. Leaves involute, flattened, erect, rigid, pungent-pointed, glaucous. Spikelets 3-8 6. *D. pungens*.
 Culms 6-18 in., much branched below. Leaves very narrow, involute, terete, wiry. Spikelets 3-8; awn twisted 7. *D. australis*.
 Culms 6-12 in. Leaves flat or involute, not terete. Spikelets 4-8; awn not twisted 8. *D. oreophila*.
 Culms 9-14 in. Leaves flat, thin. Spikelets 6-12; awn twisted 9. *D. planifolia*.

** Two outer glumes longer than the spikelets.

- Culms 12-24 in., often pilose. Panicle 1-4 in., narrow. Flowering glume with two marginal tufts of hairs, but no transverse rings. Awn long 10. *D. pilosa*.
 Culms 3-30 in., usually glabrous. Panicle 1-4 in., narrow, compact. Flowering glume with 2 dense transverse rings of silky hairs. Awn long 11. *D. semiannularis*.
 Culms 3-12 in., glabrous. Panicle $\frac{3}{4}$ -2 in. Flowering glume sparsely silky, transverse rings obscure. Awn hardly longer than the glume 12. *D. Buchananii*.
 Culms 3-9 in., glabrous. Panicle $\frac{1}{2}$ -1 $\frac{1}{2}$ in. Flowering glume with 2 minute tufts of hairs on the margins (often confluent). Awn very short indeed 13. *D. nuda*.

1. *D. Cunninghamii*, Hook. f. *Handb. N.Z. Fl.* 332.—Densely tufted, often forming large tussocks. Culms stout, 2-5 ft. high, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. at the base, glabrous or more or less pilose. Leaves 1 $\frac{1}{2}$ -4 ft. long, $\frac{1}{4}$ - $\frac{1}{3}$ in. broad, rigid and coriaceous, flat or concave, strongly nerved, midrib prominent beneath, glabrous or pilose on the margins and upper surface in the lower half of the leaf, margins scaberulous; sheaths rather lax, often $\frac{1}{2}$ in. broad or even more, deeply grooved, usually silky-pilose in the grooves; ligules reduced to a transverse line of densely set short silky hairs. Panicle large, erect or inclined, effuse or compact, 6-18 in. long; branches few or many, solitary or binate or in alternate fascicles, 3-12 in. long; branchlets slender, capillary, scaberulous, few-flowered. Spikelets rather distant, pedicelled, $\frac{1}{3}$ - $\frac{1}{2}$ in. long without the awns, 3-7-flowered. Two outer glumes unequal, lanceolate, acute or acuminate, membranous, 3-nerved, the upper one shorter than the flowering glume above it. Flowering glumes clothed with long silky hairs at the base and along the lower half of the margins, glabrous elsewhere, 7-9-nerved, deeply 2-fid at the tip with the points produced into short awns; awn from between the lobes, about $\frac{1}{3}$ in. long, straight or recurved, not flattened nor twisted at the

base. Palea nearly as long as the glume, linear-oblong.—*Buch. N.Z. Grasses*, t. 29. *D. antarctica* var. *laxiflora*, *Hook. f. Fl. Nov. Zel.* i. 302. *D. rigida*, *Hook. f. Fl. Nov. Zel.* i. 303, t. 69A (not of Raoul). *D. pentaflora*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 343. *Agrostis pilosa*, *A. Cunn. Precur.* n. 254 (not of *A. Rich.*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the Bay of Islands southwards, but often local or absent from large districts. Sea-level to 3500 ft.

A handsome species, often attaining a large size. It is distinguished from all the forms of *D. Raoulii* by the flatter leaves, which are often softly pilose on the sheaths and margins, and by the rather smaller spikelets with a straight subulate awn, not flattened nor twisted at the base.

2. ***D. ovata***, *Buch. N.Z. Grasses*, t. xxix. 2.—Culms $1\frac{1}{2}$ –2 ft. high, pilose below. Leaves 10–12 in. long, narrow, involute, pilose; ligule wanting or reduced to a narrow line of short hairs with a tuft of longer ones on each side. Panicle 3–4 in. long, erect, ovate; branches alternate, $1-1\frac{1}{2}$ in. long. Spikelets alternate on the branches, $\frac{1}{2}$ in. long, 4–6-flowered. Two outer glumes subequal, 3-nerved. Flowering glumes silky at the base, fringed on the margins and back with pencils of short hairs, 9-nerved, 2-fid at the tip, the divisions produced into short awns; central awn straight, not flattened nor twisted at the base. Palea bifid, margins with long straggling hairs.

SOUTH ISLAND: Otago—Mount Eglinton, Southland, *J. Morton*.

The above description is an abstract of Mr. Buchanan's, the plant being unknown to me. It appears to differ from *D. Cunninghamii* in the smaller size, smaller panicle, and, according to Mr. Buchanan's plate, in the numerous separate tufts of short hairs on the margins and back of the flowering glume.

3. ***D. bromoides***, *Hook. f. Fl. Nov. Zel.* i. 303, t. 68A.—Densely tufted, forming tussocks 1–4 ft. high. Culms stout, often as thick as the little finger at the base, quite glabrous, leafy throughout. Leaves longer or shorter than the culms, involute, gradually narrowed into very slender almost filiform points, coriaceous, smooth, polished, deeply striate; margins smooth, often pilose with long hairs towards the base; sheaths long, pale, compressed, grooved, margins scarious; ligules reduced to a transverse band of short densely set silky hairs. Panicle short, ovate-lanceolate or ovate-oblong, contracted, densely many-flowered, 4–6 in. long; rhachis glabrous, angled; branches short, close, suberect, 1–3 in. long. Spikelets pedicelled, about $\frac{3}{4}$ in. long without the awns, rather broad, oblong or linear-oblong, 4–10-flowered, the upper flower usually imperfect. Two outer glumes about $\frac{2}{3}$ the length of the spikelet, unequal, lanceolate, obscurely 3–5-nerved. Flowering glumes clothed in their lower half with long silky hairs on the margins and back, 7–9-nerved, sharply 2-fid at the tip, the divisions often pro-

duced into short awns; intermediate awn from between the divisions, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, stout, erect or spreading, convex or slightly flattened at the base, rarely twisted. Palea linear-oblong, 2-nerved, ciliate on the nerves.—*Handb. N.Z. Fl.* 352. *Bromus antarcticus*, *Hook. f. Fl. Antarct.* i. 97, t. 54. *Danthonia antarctica* var. *elata*, *Hook. f. Fl. Nov. Zel.* i. 302.

NORTH ISLAND: In various localities near the sea, rare and local. Auckland—Between Whangaroa and Mongonui, *T. F. C.*; Bay of Islands, *Kirk!* *T. F. C.*; Maunganui Bluff, *Petrie!* Wellington—Hills near Wellington, *Stephenson*; near Cape Palliser, *Buchanan!* AUCKLAND AND CAMPBELL ISLANDS: Abundant on the hills, *Hooker*, *Buchanan!* *Kirk!*

I do not feel at all certain that the Auckland and Campbell Islands plant, originally described by Hooker as *Bromus antarcticus*, has been rightly merged by him with the North Island *D. bromoides*. It is much larger and stouter, with larger spikelets containing more numerous florets, and often forms tussocks 3–4 ft. high, attaining a size almost equal to that of *D. Raoulii*, whereas the typical *bromoides* is rarely more than 18 in. high. If further investigation should prove it to be distinct, there seems to be no reason why Hooker's name of *D. antarctica* (*Fl. Nov. Zel.* i. 302) should not be reapplied to it, for although he also included the plant now known as *D. Cunninghamii* it was as a separate variety, the Auckland Islands plant being evidently treated as the type of the species.

4. *D. Raoulii*, *Steud. Syn. Pl. Gram.* 246.—Densely tufted, forming large brownish-green tussocks 2–5 ft. high. Culms stout or slender, smooth, often branched at the base. Leaves numerous, longer or shorter than the culms, variable in width at the base, gradually narrowed into long filiform points, strongly involute and rush-like when dry, coriaceous, smooth and polished on the back, ribbed on the inner face; margins smooth, glabrous or pilose just above the ligules; sheaths brownish, much broader than the blade, often lax and scarious towards the base, coriaceous above, glabrous or sparsely pubescent; ligules reduced to a transverse band of short dense hairs. Panicle variable in size, 4–18 in. long, lax; branches few or many, divided, slender, filiform, smooth and glabrous; pedicels long, often silky towards the tips. Spikelets $\frac{1}{2}$ – $\frac{3}{4}$ in. long without the awns, 4–10-flowered. Two empty glumes unequal, from $\frac{1}{2}$ – $\frac{2}{3}$ the length of the spikelet, ovate-lanceolate, the lower 3-nerved, the upper 5-nerved, the lateral nerves usually short. Flowering glumes with long silky hairs at the base and on the margins for half their length or more, often also fringed on the lower part of the back, deeply bifid at the tip, the divisions usually produced into short scabrid awns, 7–9-nerved; central awn long, $\frac{1}{3}$ – $\frac{1}{2}$ in., straight or recurved, flattened and usually twisted at the base. Palea rather shorter than the glume, 2-nerved, silky on the nerves.—*Buch. N.Z. Grasses*, t. 30. *D. rigida*, *Raoul*, *Chorx*, 12; *Hook. f. Fl. Nov. Zel.* i. 303, t. 69A (not of *Steud.*).

Var. *flavescens*, *Hack. MSS.*—More robust; culms often $\frac{1}{2}$ in. diam at the base. Leaves broader; sheaths sometimes $\frac{1}{2}$ – $\frac{3}{4}$ in. across; lamina $\frac{1}{4}$ – $\frac{1}{3}$ in. at the base. Spikelets rather larger.—*D. flavescens*, *Hook. f. Handb. N.Z. Fl.* 332; *Buch. N.Z. Grasses*, t. 32.

Var. **Cheesemanii**, Hack. MSS.—Culms slender. Leaves pale-green, complicate, compressed, not terete and rush-like when dry, strongly ribbed on both surfaces; margins and ribs on the back rough and scabrid. Panicle-branches scaberulous. Awn rarely twisted.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Mount Hikurangi and Mount Egmont southwards, abundant in hilly and mountain districts. Sea-level to 5000 ft. "Snow-grass." Var. *Cheesemanii*: Open forests near the source of the Takaka River, Nelson, altitude 3000 ft., T. F. C.

A most abundant plant in the elevated hilly districts of the South Island, often forming the major portion of the vegetation over large areas. I agree with Professor Hackel in considering *D. flavescens* to be simply a broad-leaved state of *D. Raoulii*, in point of fact the two forms graduate into one another so insensibly that it is impossible to draw a strict line of demarcation between them.

5. **D. crassiuscula**, T. Kirk in Trans. N.Z. Inst. xvii. (1885) 224.—Culms tufted, forming lax tussocks, stout, strict, erect, leafy, 6–18 in. high. Leaves shorter or rarely longer than the culms, distichous, rigid and coriaceous, curved, gradually narrowed to the tips but not drawn out into filiform points, strongly involute, compressed, smooth and polished on the back, with numerous thick veins in front, margins smooth; sheaths stout, much broader than the blade, smooth, grooved, margins thinner and scarious; ligules reduced to an obscure band of short stiff hairs. Panicle short, lax, broadly ovate, $1\frac{1}{2}$ –3 in. long; branches few, spreading, 2–3-spiculate, and with the rhachis more or less silky-pubescent. Spikelets about $\frac{1}{3}$ in. long without the awns, 4–7-flowered. Two outer glumes unequal, lanceolate, 3–5-nerved, the longer frequently $\frac{4}{5}$ the length of the entire spikelet. Flowering glumes densely silky at the base, and with long silky hairs on the margins and back for about half their length, 7–9-nerved, the nerves connected by transverse veins at about the level of the awn, tip deeply bifid, the lobes pointed but not awned; central awn $\frac{1}{4}$ – $\frac{1}{3}$ in. long, flat at the base and often twisted. Palea slightly shorter than the glume.

SOUTH ISLAND: Canterbury—Mountains above the Broken River, T. F. C.; Upper Waimakariri, Cockayne! Westland—Kelly's Hill, Petrie! Otago—Mount Arnould, Hector Mountains, Petrie! mountains above Lake Harris, Longwood Range, Kirk! STEWART ISLAND: Mount Anglem, Kirk! 3500–6000 ft.

Closely allied to *D. Raoulii*, but a smaller and proportionately stouter plant, with shorter compressed leaves not drawn out into filiform points, much smaller panicles with silky-pubescent branches, smaller spikelets with longer outer glumes, and with the nerves of the flowering glumes connected by transverse veinlets.

6. **D. pungens**, Cheesem. n. sp.—Culms densely tufted, branched at the base, forming irregular patches about 1 ft. across, smooth, slender, rigid, 2–6 in. high. Leaves mostly at the base of the culms and much shorter than them, distichous, $1\frac{1}{2}$ –3 in. long, about $\frac{1}{10}$ in. broad at the base, gradually tapering upwards into a pungent point,

strict, erect, rigid and coriaceous, involute, almost equitant at the base, finely striate, glaucous; margins thickened, smooth; sheaths compressed, grooved; ligules reduced to a narrow band of short white hairs. Panicle small, lax, ovate, 1-1½ in. long, of 3-8 spikelets; branches few, slender, silky. Spikelets about ⅓ in. long without the awns, 3-5-flowered. Two outer glumes slightly unequal, almost as long as the spikelet, lanceolate, membranous, 3-5-nerved. Flowering glumes silky at the base, and equally clothed with silky hairs for half their length, 7-9-nerved, deeply 2-fid at the apex, the lobes lanceolate, acute but not awned; central awn flattened and usually spirally twisted at the base. Palea almost as long as the flowering glume, ciliate on the nerves and silky on the margins near the base.

STEWART ISLAND: Smith's Lookout, altitude 1000 ft., *Kirk*!

A curious little plant, at once recognised by the flattened rigid and pungent-pointed leaves.

7. *D. australis*, *Buch. N.Z. Grasses*, t. 31.—Forming extensive patches on alpine or subalpine slopes. Culms much branched at the base, prostrate or decumbent and covered with the remains of the old leaves, ascending and then erect above, quite glabrous, 6-18 in. high. Leaves numerous towards the base of the culms and much shorter than them, distichous, inbricate, strict, rigid, erect or curved to one side, 2-6 in. long, about ¼ in. broad, closely involute, smooth and polished, acute at the tip; sheaths short, closely overlapping, tight, much broader than the blade; ligules reduced to a line of silky hairs. Panicle small, lax, 1-2 in. long, of 3-8 spikelets on slender capillary silky-pubescent branches. Spikelets ½-⅔ in. long, 4-7-flowered. Two outer glumes slightly unequal, lanceolate, acuminate, membranous, 5-7-nerved, from ⅔ to ⅝ the length of the spikelet. Flowering glumes silky at the base and with the back and margins fringed with silky hairs for more than half their length, deeply 2-fid at the tip, the divisions produced into short scabrid awns, 7-9-nerved; central awn ⅓-½ in. long, slender, flat and spirally twisted at the base. Palea shorter than the glume, linear-oblong.—*D. Raoulii* var. *australis*, *Buch. in Trans. N.Z. Inst.* iv. (1872) 224.

SOUTH ISLAND: Not uncommon on the mountains of Nelson, Canterbury, and Westland, altitude 3500-6000 ft. "*Carpet-grass*"; "*Hassock-grass*."

A well-marked species, often covering acres on the higher mountains of Nelson and North Canterbury, usually affecting steep slopes. After the melting of the snow in early summer, which usually leaves the culms and leaves pointing downhill, these slopes are most slippery and treacherous to cross. There is a specimen in Mr. Petrie's herbarium marked "*Campbell Island, J. Buchanan*."

8. *D. oreophila*, *Petrie in Trans. N.Z. Inst.* xxvii. (1895) 406.—Culms densely tufted, much branched at the base, slender, erect, leafy, 6-12 in. high. Leaves subdistichous, 2-5 in. long by ⅛-1/16 in.

broad at the base, tapering upwards into long slender points, flat or involute, grooved, margins scaberulous above; ligules reduced to a transverse band of short dense hairs with a few longer ones on each side. Panicle about $1\frac{1}{2}$ in. long, broadly ovate, lax, of 4-8 spikelets; branches few, capillary, glabrous or with a tuft of silky hairs at the forks. Spikelets $\frac{1}{4}$ - $\frac{1}{3}$ in. long, 4-7-flowered. Two outer glumes slightly unequal, acute, membranous, 3-5-nerved, about $\frac{4}{5}$ the length of the spikelet. Flowering glumes densely silky at the base and on the margins for half their length, a few silky hairs also along the lower part of the back, membranous, 9-nerved, deeply 2-fid at the tip, the lobes broad, acute but not awned; intermediate awn from between the lobes, about $\frac{1}{5}$ in. long, reflexed, flattened at the base but not twisted. Palea linear-oblong, 2-nerved, ciliate on the nerves.—*D. pallida*, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 271 (*not of R. Br.*).

SOUTH ISLAND: Canterbury—Candlestick Range, *Cockayne!* Westland—Kelly's Hill, *Petrie!* 3500-4500 ft.

Allied to *D. australis*, but much less rigid and not so densely tufted, with broader flatter leaves; the panicle-branches are nearly glabrous and the spikelets smaller and paler; the terminal lobes of the flowering glume are broader and not awned; and the central awn is shorter and not twisted at the base. It is still nearer to *D. planifolia*.

9. *D. planifolia*, *Petrie in Trans. N.Z. Inst.* xxxiii. (1901) 328.—Culms apparently not tufted, sparingly branched at the base, erect, slender, glabrous, 9-14 in. high. Leaves chiefly at the base of the culms and much shorter than them, 2-5 in. long, $\frac{1}{10}$ - $\frac{1}{6}$ in. broad, gradually tapering to an acute point, flat, smooth, striate; sheaths rather lax, pale, grooved, the uppermost much longer than the blade; ligules a transverse band of long soft hairs. Panicle short, lax, ovate, $1\frac{1}{2}$ -2 in. long, of 6-12 spikelets; branches few, slender, silky with long hairs. Spikelets rather large, about $\frac{1}{2}$ in. long, pale-green tinged with purple, 3-5-flowered. Two outer glumes subequal, lanceolate, acuminate, membranous, 3-5-nerved, about as long as the spikelet. Flowering glumes densely silky at the base, and with long silky hairs along the margins and back for half their length, deeply 2-fid at the apex, the lobes acute or acuminate, but scarcely awned, 7-9-nerved; intermediate awn from between the lobes, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, more or less flattened and twisted at the base. Palea linear-oblong, deeply bifid, 2-nerved, nerves ciliate.

SOUTH ISLAND: Otago—Clinton Saddle, to the west of Lake Te Anau, *Petrie!* 2500 ft.

This only differs from *D. oreophila* in the flatter and more membranous leaves, larger spikelets with longer empty glumes, and longer awn usually twisted at the base. I have seen few specimens, and these all from one locality. It is not improbable that further investigations may reduce the plant to a variety of *D. oreophila*.

10. *D. pilosa*, *R. Br. Prodr.* 177.—Culms tufted, slender, glabrous or sparingly pilose, leafy at the base, 1–2 ft. high, rarely more. Leaves usually much shorter than the culms, narrow, often setaceous, involute or rarely flat, glabrous or pilose with spreading hairs; sheaths narrow, grooved, pilose or glabrous; ligules reduced to a transverse band of long soft hairs. Panicle 1–4 in. long, usually narrow and contracted, sometimes racemiform; branches short, erect. Spikelets about $\frac{1}{2}$ in. long, 4–8-flowered. Two outer glumes exceeding the flowering glumes, subequal, lanceolate, acute, membranous, 7-nerved. Flowering glumes 7–9-nerved, deeply 2-lobed at the tip, the lobes produced into fine awns as long or longer than the glume, central awn from between the lobes, exerted beyond the spikelet, flattened and spirally twisted and often dark-coloured at the base, a tuft of silky hairs at the base of the callus or pedicel of the glume, a tuft on the margin on each side above the callus, sometimes connected by hairs on the back, and another marginal tuft on each side opposite to the base of the lobes, the sides and back between usually glabrous. Palea broad, obtuse or shortly bifid at the tip.—*Hook. f. Fl. Nov. Zel.* i. 303; *Fl. Tasm.* ii. 120; *Benth. Fl. Austral.* vii. 594; *Buch. N.Z. Grasses*, t. 33. *D. semiannularis* var. *pilosa*, *Hook. f. Handb. N.Z. Fl.* 333. *D. nervosa*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 612 (not of *Hook. f.*).

Var. *racemosa*, *Buch. N.Z. Grasses*, t. 33(2)B.—Culms very slender, drooping. Panicle reduced to a slender raceme of 4–10 almost sessile spikelets.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Sea-level to 4000 ft.

D. pilosa is technically distinguished from *D. semiannularis* by the absence of the transverse ring of hairs on the flowering glume just below the lobes. In the typical state this ring is reduced to a small tuft of hairs on each margin of the glume, the sides and back between the tufts being quite glabrous. But occasionally there are a few hairs on the back of the glume as well, and sometimes these become so numerous as almost to form a transverse ring, thus breaking down the distinction between the two species. *D. pilosa* is also found in Australia, ranging from Queensland to Tasmania and West Australia.

11. *D. semiannularis*, *R. Br. Prodr.* 177.—Very variable in size, usually 1–2 ft. high, but often dwarfed to a few inches, and sometimes attaining 3 ft. Culms tufted, slender, smooth, glabrous or sparingly pilose. Leaves shorter than the culms, narrow, flat or involute, often almost setaceous; sheaths grooved, glabrous or pilose with long spreading hairs; ligules reduced to a narrow transverse band of soft silky hairs, those on the outside the longest. Panicle 1–4 in. long, usually compact and more or less contracted; branches few, short, erect. Spikelets $\frac{1}{4}$ – $\frac{1}{2}$ in. long without the awns, 3–8-flowered. Two outer glumes exceeding the flowering glumes, subequal, lanceolate, acute, membranous, 5–7-nerved. Flowering glumes 7–9-nerved, deeply 2-lobed at the tip, the

lobes produced into fine awns often as long as the glume, central awn from between the lobes, usually exserted beyond the spikelet, flat and spirally twisted at the base, a ring of short silky hairs around the glume at the base, and a transverse ring of longer hairs (often arranged in separate tufts) just below the base of the lobes. Palea exceeding the base of the awn, narrow-oblong.—*Hook. f. Fl. Nov. Zel. i. 304; Handb. N.Z. Fl. 333; Benth. Fl. Austral. vii. 595; Buch. N.Z. Grasses, t. 34. D. unarede, Raoul, Choix, 11, t. 4. D. gracilis, Hook. f. Fl. Nov. Zel. i. 303, t. 69B.*

Var. *setifolia*, *Hook. f. Fl. Nov. Zel. i. 304.*—Culms more densely tufted. Leaves very narrow, terete from the strongly involute margins, strict, wiry, erect. Panicle smaller, with fewer spikelets. Flowering glumes less copiously silky, the hairs of the upper transverse band shorter.—*D. semiannularis var. alpina, Buch. in Trans. N.Z. Inst. iv. (1872) 225; N.Z. Grasses, t. 34(2)A.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, var. *setifolia* in mountainous situations. Sea-level to 4500 ft.

Also abundant throughout the whole of temperate Australia. In New Zealand this species and *D. pilosa* are now largely sown as pasture grasses, especially in the northern part of the colony. On stiff clay soils they are far more permanent than most introduced species, and might with advantage be substituted for them.

12. *D. Buchanani*, *Hook. f. Handb. N.Z. Fl. 333.*—Culms tufted, slender, smooth, quite glabrous, 3–12 in. high. Leaves mostly at the base of the stems and much shorter than them, strict, erect, wiry, very narrow, involute, filiform or nearly so; sheaths pale, glabrous, deeply grooved; ligules reduced to a band of short white hairs. Panicle small, contracted, $\frac{3}{4}$ –2 in. long, of 4–12 spikelets; branches few, scaberulous. Spikelets pale-green, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, 3–5-flowered. Two outer glumes exceeding the flowering glumes and often the awns as well, subequal, oblong-lanceolate, acute, 3–5-nerved. Flowering glumes 7–9-nerved, 2-lobed at the tip, the lobes produced into short awns, central awn from between the lobes, short, hardly equalling the length of the glume, straight or bent, not at all or very obscurely twisted at the base, a tuft of silky hairs at the base of the glume and on the margins higher up, usually connected by straggling hairs on the back and sides, forming an indistinct transverse ring. Palea oblong, 2-nerved; nerves ciliate.

SOUTH ISLAND: Canterbury—Upper Waimakariri, *Kirk! Petrie! T. F. C.*; Mount Torlesse, *Petrie!* Otago—Lake district, *Hector and Buchanan! Kurow, Mount Ida, Macrae's, Pembroke, Bendigo, Lake Te Anau, Petrie!* 1000–3000 ft.

Very closely allied to *D. semiannularis*, with which Professor Hackel is disposed to unite it. But the spikelets are smaller, the awns shorter, often not exserted beyond the outer glumes, and the flowering glume is shorter and broader, and more sparingly silky. The plant figured by Mr. Buchanan in his *New Zealand Grasses* (t. 35) as *Danthonia Buchanani* is a slender form of *Hierochlæa redolens*.

13. **D. nuda**, *Hook. f. Fl. Nov. Zel.* ii. 337. — Culms slender, tufted, branched at the base, quite glabrous, 3–9 in. high. Leaves much shorter than the culms, involute, filiform, quite smooth and glabrous; sheaths pale, grooved; ligules reduced to a band of silky hairs. Panicle small, erect, contracted, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, of 5–15 spikelets; branches few, short, pubescent. Spikelets greenish-white, small, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, 3–6-flowered. Two outer glumes usually exceeding the flowering glumes and awns, subequal, oblong-lanceolate, acute, 3–5-nerved. Flowering glumes short and broad, ovate, 7–9-nerved, very shortly bifid at the tip, central awn from between the lobes, very short, $\frac{1}{8}$ – $\frac{1}{5}$ the length of the glume, not twisted at the base, a tuft of silky hairs at the base of the glume, and two small marginal tufts (sometimes confluent) on each side higher up, back of the glume quite glabrous. Palea oblong, shorter than the glume. — *Handb. N.Z. Fl.* 333; *Buch. N.Z. Grasses*, t. 36A. *D. Thomsoni*, *Buch. N.Z. Grasses*, t. 36(2).

NORTH ISLAND: Mountains near the East Coast, *Colenso*. SOUTH ISLAND: Nelson — Mount Arthur Plateau, *T. F. C.* Canterbury — Broken River, *Petrie*! *T. F. C.*; Poulter River, *Cockayne*! Lake Tekapo, *T. F. C.* Otago — Kabiku Hills, *Buchanan*; common in dry places in the eastern and central portions of the district, *Petrie*! Sea-level to 3500 ft.

The description given above is based upon South Island specimens, the plant not having been observed in the North Island since its original discovery by Mr. Colenso sixty years ago. As Hooker's description does not quite match the southern plant, the identity of the two must remain doubtful for the present.

24. **ELEUSINE**, Gaertn.

Annual or perennial grasses. Leaves long, flat or folded, firm or membranous. Spikelets 3- to many-flowered, laterally compressed, sessile and densely imbricate in 2 rows on one side of a flattened rhachis, forming linear spikes; spikes digitately arranged or irregularly scattered; rhachilla disarticulating above the outer glumes. Two outer glumes shorter than the flowering glumes, persistent, empty, unequal, keeled, obtuse or mucronate, membranous, 3–5-nerved. Flowering glumes similar to the outer glumes, 3-nerved at the base. Palea shorter than the glumes, complicate and 2-keeled. Lodicules 2, minute. Stamens 3; anthers short. Styles short, distinct; stigmas plumose. Grain broadly oblong, grooved; pericarp lax, hyaline.

Species 6, most plentiful in tropical Asia and Africa, the one found in the New Zealand area a weed in all warm countries.

1. **E. indica**, *Gaertn. Fruet.* i. 8. — Annual. Culms tufted, erect or decumbent at the base, branched, stout or slender, compressed, quite glabrous, 9–24 in. high. Leaves numerous, distichous, 4–9 in. long, $\frac{1}{8}$ – $\frac{1}{3}$ in. broad, flat, rather flaccid, acuminate; sheaths compressed, pale, margins ciliate; ligules almost obsolete. Spikes

rather slender, straight, $1\frac{1}{2}$ –3 in. long, usually 3–6 in a terminal umbel, generally one inserted lower down; rhachis smooth or pubescent at the base. Spikelets about $\frac{1}{6}$ in. long, densely imbricated, 3–6-flowered. Two outer glumes unequal, the lower small, 1-nerved; the upper 3–5-nerved. Flowering glumes much larger, ovate when spread out, acute, 3-nerved. Grain oblong; pericarp very lax and membranous, enclosing the rugose seed.—*Benth. Fl. Austral.* vii. 615; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 176.

KERMADEC ISLANDS: Lower portions of Sunday Island and on Meyer Island, plentiful and apparently indigenous, *T. F. C.* NORTH AND SOUTH ISLANDS: Naturalised near Auckland, *Sinclair*, and at Westport, *Townson*!

25. ARUNDO, Linn.

Tall perennial reed-like grasses. Culms densely tufted, stout, almost woody at the base. Leaves flat. Spikelets numerous, laterally compressed, 2–7-flowered, arranged in large decompound panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes persistent, empty, subequal, lanceolate, acuminate, membranous, glabrous. Flowering glumes ovate-lanceolate, 3–5-nerved, pilose along the back and towards the base with long silky hairs, 2-fid at the apex, with a cuspidate point or awn from between the lobes. Palea short, hyaline, 2-nerved. Lodicules 2, obovate. Stamens 3. Ovary glabrous; styles distinct; stigmas plumose. Grain oblong, free within the flowering glume and palea.

A small genus of 6 or 7 species, dispersed through most tropical and warm-temperate regions. The two species found in New Zealand are endemic.

Two outer glumes including the flowering glumes and their awns. Flowering glumes deeply bifid, the divisions long and bristle-pointed 1. *A. conspicua*.

Two outer glumes shorter than the awns of the flowering glumes. Flowering glumes not so deeply bifid, the divisions scarcely bristle-pointed 2. *A. fulvida*.

1. *A. conspicua*, *Forst. Prodr.* n. 48.—Forming huge dense tussocks with numerous long curving leaves. Culms 3–10 ft. high, as thick as the finger at the base, slender, erect, smooth, hollow. Leaves long, narrow, coriaceous, flat or involute, strongly nerved, smooth or scabrid along the margins and on the nerves of the upper surface; sheaths long, smooth; ligules reduced to a transverse band of short stiff hairs. Panicle very handsome, silky-white or yellowish-white, copiously branched, 1–2 ft. long; branches drooping, very many-spiculate, smooth or pilose-scabrid. Spikelets 1–3-flowered, on short capillary pedicels. Two outer glumes subequal, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, longer than or at least equalling the awns of the flowering glumes, narrow-lanceolate, gradually tapering into long

acuminate points, membranous, 1-nerved, usually with a very short lateral nerve on each side near the base. Flowering glumes hyaline, 3-nerved, lower half densely clothed with long silky hairs, deeply 2-fid at the tip, the divisions produced into bristle-like awns; central awn from between the divisions, long, slender, scabrid. Palea shorter than the glume, pubescent on the nerves.—*Hook. f. Fl. Nov. Zel.* i. 299; *Handb. N.Z. Fl.* 331; *Buch. N.Z. Grasses*, t. 27; *Bot. Mag.* t. 6232. *A. australis*, *A. Rich. Fl. Nouv. Zel.* 121; *A. Cunn. Precur.* n. 265. *A. Kakao*, *Steud. Syn. Pl. Gram.* 194. *Achnatherum conspicuum*, *Beauv. Agrost.* 146. *Gynerium zeelandicum*, *Steud. Syn. Pl. Gram.* 198. *Calamagrostis conspicua*, *Gmel. Syst.* 172. *Agrostis conspicua*, *Roem. and Schult. Syst.* ii. 364; *A. Rich. Fl. Nouv. Zel.* 127; *A. Cunn. Precur.* n. 250; *Raoul, Choix*, 39.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout in damp lowland situations. *Toetoe-Kakaho*; culms of, *Kakaho*.

The largest grass in the colony, forming a very characteristic feature of the vegetation in all swampy tracts, river-banks, sandhills, &c. The culms were formerly largely used by the Maoris for lining their meeting-houses, and were often dyed in elaborate patterns.

2. *A. fulvida*, *Buch. in Trans. N.Z. Inst.* vi. (1874) 242.—Habit and general appearance of *A. conspicua*, but rather smaller, culms seldom more than 6 ft. high. Panicle pale-fulvous, usually more compact, broader and more erect, 1–2 ft. long. Spikelets 1–3-flowered. Two outer glumes shorter, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, not drawn out into such long points, and usually considerably shorter than the awns of the flowering glumes. Flowering glumes not so deeply bifid at the tip, the divisions scarcely awned; central awn exerted beyond the outer glumes.—*N.Z. Grasses*, t. 28. *A. conspicua* var. *fulvida*, *Kirk in Trans. N.Z. Inst.* x. App. xliii.

NORTH AND SOUTH ISLANDS: From the Bay of Islands to Foveaux Strait, not nearly so abundant as *A. conspicua*.

This does not differ from *A. conspicua* except in the outer glumes not including the awns of the flowering glumes, and in the terminal lobes of the flowering glumes being shorter and scarcely awned. It would probably be better treated as an extreme form of *A. conspicua* than as a separate species.

The widely distributed *Phragmites communis*, Trin., the common Reed of Europe, has been recorded by Baron Mueller as a native of New Zealand on the strength of a specimen said to have been collected by Dr. Haast at the Grey River, Westland (Veg. Chath. Is. 61). But it has not been collected by any other explorer, and there are no native specimens in any New Zealand herbarium. Probably Dr. Haast's specimen was not truly indigenous. *Phragmites* can be distinguished from *Arundo* by the lowermost flower of the spikelet being male, and by the flowering glume being glabrous, the long silky hairs being confined to the rhachilla.

26. **TRIODIA**, R. Br.

Perennial grasses, of very various habit. Leaves narrow, rigid. Spikelets 2- to many-flowered, arranged in a lax or narrow panicle; rhachilla disarticulating above the 2 outer glumes and between the flowering glumes. Two outer glumes longer or shorter than the flowering glumes, somewhat rigid, empty, keeled, acute, awnless. Flowering glumes more or less imbricated, rounded on the back at the base, coriaceous or chartaceous, often hairy on the margins and callus, 3-nerved, 3-lobed or 3-toothed at the apex, the lobes equal or the central one produced into a short awn or mucro. Palea broad, thin, with 2 almost marginal keels. Lodicules 2. Stamens 3. Styles short, distinct; stigmas plumose. Grain usually compressed on the back, free within the flowering glume and palea.

Species from 25 to 30, mostly in the temperate regions of both hemispheres, a few in tropical America. The New Zealand species belong to the subgenus *Rhombolytrum*, characterized by the lateral teeth of the flowering glume being very small or almost obsolete, the middle tooth being also small and mucronate. It contains a few Chilian and North American species in addition to the three found in New Zealand, all of which are endemic.

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|--|--------------------------|
| Densely matted; culms 1-3 in. Panicle often reduced to a single spikelet. Outer glumes ovate. Flowering glumes silky on the margins, distinctly 3-toothed at the apex | 1. <i>T. exigua</i> . |
| Culms tufted, 2-6 in. Panicle of 8-12 spikelets. Outer glumes lanceolate. Flowering glumes sparsely silky, 5-7-nerved, minutely 3-toothed at the apex | 2. <i>T. pumila</i> . |
| Culms tufted, 2-4 in. Panicle of 6-15 spikelets. Outer glumes broadly ovate. Flowering glumes glabrous, 9-nerved, obscurely 3-toothed or irregularly erose at the apex | 3. <i>T. australis</i> . |

1. **T. exigua**, *T. Kirk in Trans. N.Z. Inst.* xiv. (1882) 378.—Small, densely matted, forming a compact sward. Rhizomes long, creeping, branched. Culms erect from the rhizome, slender, wiry, glabrous, $1\frac{1}{2}$ -4 in. high. Lower leaves reduced to sheathing scales; upper shorter than the culms, $\frac{1}{2}$ -2 in. long, very narrow, convolute, filiform, rigid, erect or curved, acute or almost pungent at the tip, quite glabrous; sheaths closely appressed, pale, membranous, grooved; ligules reduced to a line of short stiff hairs. Panicle frequently reduced to a single spikelet, sometimes 2-3, rarely as many as 4-5; pedicels short, slender, minutely scaberulous. Spikelets about $\frac{1}{3}$ in. long, ovoid-oblong, 2-4-flowered. Two outer glumes subequal, as long as the flowering glumes or very slightly shorter than them, concave, ovate, subacute, rigid, the lower one 5-nerved, the upper 7-nerved. Flowering glumes broadly ovate, silky on the margins and back towards the base, minutely scaberulous above, 9-nerved, shortly 3-toothed at the apex, the middle tooth mucroniform, not much longer than the lateral teeth. Palea broad, ciliate on the keels.—*Danthonia pauciflora*, *Buch. N.Z. Grasses*, t. 36B (*not of R. Br.*).

SOUTH ISLAND: Nelson—Clarence Valley, *T. F. C.* Canterbury—Upper Waimakariri and Broken River, *Enys! Kirk! Cockayne! T. F. C.* Otago—Not uncommon in the dry plains of the central and north-western portions of the district, *Petrie!* 500–3000 ft.

A curious little species, with much of the habit of small states of *Zoysia pungens*.

2. *T. pumila*, *Hack. MSS.*—Culms tufted, slender, glabrous, much branched at the base, 2–8 in. high. Leaves shorter than the culms, very narrow, involute, filiform, strict, erect, 1–2 in. long; sheaths pale, membranous, deeply grooved, glabrous or sparingly pilose with long soft hairs; ligules reduced to a transverse ring of hairs. Panicle $\frac{1}{2}$ –1 in. long, strict, erect, much contracted, of 3–15 spikelets; branches very short, erect, pubescent. Spikelets $\frac{1}{6}$ – $\frac{1}{5}$ in. long, lanceolate, 2–3-flowered. Two outer glumes exceeding the flowering glumes, subequal, lanceolate, acute or subacute, 3–5-nerved. Flowering glumes broadly ovate, sparsely silky-pilose on the margins and back, faintly 5–7-nerved, minutely 3-toothed at the apex, the central tooth mucroniform. Palea bifid at the tip, 2-keeled, ciliolate on the keels.—*Atropis pumila*, *Kirk in Trans. N.Z. Inst.* xiv. (1882) 379.

SOUTH ISLAND: Canterbury—Upper Waimakariri and Broken River, *Kirk! T. F. C.*; mountains near Lake Tekapo, *T. F. C.* Otago—Not uncommon in mountainous districts, *Buchanan! Petrie! Kirk! Aston!* Altitudinal range usually from 2000 to 5000 ft., but descending to sea-level in the south of Otago.

Referred to *Atropis* by Mr. Kirk, but clearly a *Triodia*, and closely allied to the following species, from which it differs in the longer and narrower spikelets, narrow outer glumes, and silky flowering glumes, which are distinctly though minutely 3-toothed at the apex.

3. *T. australis*, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 442.—Culms densely tufted, much branched at the base, erect or spreading, quite glabrous, leafy below, 2–4 in. high. Leaves usually shorter than the culms, narrow, involute, filiform, deeply striate; sheaths broad, grooved, pale; ligules reduced to a narrow band of short white hairs with a longer tuft on each side. Panicle small, strict, erect, contracted, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, of 6–15 spikelets; branches 4–6, short, pubescent. Spikelets about $\frac{1}{8}$ in. long, 2–4-flowered. Two outer glumes rather shorter than the flowering glumes, subequal, broadly ovate, obtuse, 7-nerved; margins broad, pale. Flowering glumes very broadly ovate or rounded, glabrous, firm, 9-nerved, minutely and irregularly 3-toothed or erose at the tip. Palea broad, 2-keeled, the keels ciliolate.

Var. mucronulata, Hack. MSS.—Sheaths pilose with long hairs. Spikelets 3-5-flowered, the outer glumes distinctly shorter than the flowering glumes, which are more evidently 3-toothed, the middle tooth produced into a short mucro.

SOUTH ISLAND: Otago—Sides of mountain-streams. Clark's Diggings, Mount Cardrona, Old Man Range, Maungatua, Blue Mountains, *Petrie!* **Var. mucronulata:** Swamps in the Tasman Valley, Canterbury, *T. F. C.* 2000-5000 ft.

27. **KŒLERIA**, Pers.

Perennial or annual grasses. Leaves narrow; ligules hyaline. Spikelets 2-5-flowered with the uppermost flower sterile, laterally compressed, shining, densely crowded in spike-like panicles; rachilla disarticulating above the outer glumes and between the flowering glumes, produced beyond the uppermost flower. Two outer glumes persistent, empty, unequal, keeled, acute or acuminate, margins hyaline. Flowering glumes exceeding the outer glumes, with broader hyaline margins, 3-5-nerved, entire or bifid, acuminate or mucronate or shortly awned. Palea white and hyaline, 2-toothed. Lodicules 2. Stamens 3. Styles short, distinct; stignas plumose. Grain oblong, laterally compressed, free within the flowering glume and palea.

Species 12 or 15, mainly in the temperate parts of the Northern Hemisphere, rarer in the south temperate zone. The single New Zealand species is also found in South America.

1. **K. Kurtzii**, *Hack. in Bolet. Acad. Sc. de Cordoba*, xvi. (1900) 261.—Culms densely tufted, erect, rather slender, glabrous or pubescent, 6-24 in. high. Leaves crowded near the base of the culms, 2-9 in. long, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad, flat, soft or almost flaccid, glabrous or more or less pubescent, sometimes almost villous; sheaths long, rather tight, striate, pubescent or villous; ligules short, truncate, ciliolate. Panicle 1-5 in. long, cylindric, usually dense and spike-like, but sometimes irregularly interrupted or lobed; branches short, erect, minutely villous-pubescent. Spikelets pale-green or pale purplish-green, shining, about $\frac{1}{8}$ in. long, 2-3-flowered. Two outer glumes broadly hyaline, acute, 3-nerved, often scabrid on the keel. Flowering glumes oblong-lanceolate, glabrous or minutely rough on the back, 5-nerved, tip minutely 2-toothed or almost entire, with a very short scabrid awn inserted just below the teeth.—**K. cristata**, *Hook. f. Fl. Nov. Zel.* i. 305; *Handb. N.Z. Fl.* 334; *Buch. N.Z. Grasses*, t. 38 (not of Pers.). **K. micrathera**, *Griseb. in Goett. Abh.* xxi. (1879) 292 (but not *Trisetum micratherrum*, *Desv.*).

SOUTH ISLAND: Abundant in hilly and mountainous localities throughout. Sea-level to 4500 ft.

Also in temperate South America (Argentina), and probably also in Australia. Professor Hackel distinguishes it from the northern *K. cristata* by the

29—Fl.

flowering glume being minutely 2-toothed at the apex with a short awn protruding from below the sinus, whereas in *K. cristata* the flowering glume is entire and not awned. I find that the awn varies much in length, and is frequently almost obsolete.

28. POA, Linn.

Annual or perennial grasses. Leaves flat or convolute; ligules hyaline. Spikelets usually 2-6-flowered, laterally compressed, in lax or contracted rarely spiciform panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes, glabrous or sparsely hairy. Two outer glumes persistent, empty, keeled, membranous, 1-2-nerved, usually shorter than the flowering glumes. Flowering glumes obtuse or acute, not awned, keeled, 5-7-nerved or rarely 3-nerved, nerves often conniving near the top, callus and marginal nerves often clothed with crisped or tangled woolly hairs. Palea shorter than the flowering glume, 2-keeled. Lodicules 2. Stamens 3. Ovary glabrous; styles short, distinct; stigmas plumose. Grain ovoid or oblong or linear-oblong, compressed, often grooved, free or adherent to the palea; hilum small, basal, punctiform.

A large genus of over 100 species, comprising several important fodder-grasses, abundant in all temperate and cold climates, in the tropics found only on high mountains. The species are in all countries highly variable and difficult of discrimination, but nowhere more so than in New Zealand. Of the 23 species admitted in this work, two extend to Australia and Tasmania, the remainder are endemic. In addition to the indigenous species, several others from the Northern Hemisphere are now well established in most districts, the most abundant being *P. annua*, Linn., and *P. pratensis*, Linn., descriptions of which will be found in any British Flora.

A. Two outer glumes reaching more than half-way up the flowering glumes immediately above them. Flowering glumes acuminate, often incurved at the tip. Anthers $\frac{1}{15}$ – $\frac{1}{10}$ in. long, linear.

Culms 1-4 ft., leafy throughout. Leaves flat, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad.

Panicle 3-10 in. Flowering glumes prominently 5-nerved, callus and lower part of keel and margins villous with crisped hairs

1. *P. foliosa*.

Culms 3-18 in., leafy at the base. Leaves flat, $\frac{1}{12}$ – $\frac{1}{4}$ in. broad. Panicle 1-4 in. Flowering glumes faintly 5-nerved, glabrous except a tuft of crisped hairs on the callus

2. *P. novæ-zelandiæ*.

Culms 6-24 in., densely tufted. Leaves terete, filiform.

Panicle 1-3 in. Flowering glumes prominently 5-nerved, densely scabrid, rarely with crisped hairs at the base

3. *P. litorosa*.

Culms 8-18 in., naked and decumbent below, branched and erect above. Leaves flat, flaccid. Panicle 1-2 in. Flowering glumes faintly 5-nerved, smooth and glabrous or a tuft of crisped hairs on the callus

4. *P. ramosissima*.

Culms 6-18 in., branched, distichously leafy. Leaves flat, $\frac{1}{10}$ in. broad. Panicle 1-3 in. Flowering glumes prominently 5-nerved, sharply scabrid on the keel, lower part of keel and callus with crisped hairs

5. *P. polyphylla*.

B. Two outer glumes reaching more than half-way up the flowering glumes immediately above them. Flowering glumes obtuse or subacute, rarely acute. Anthers $\frac{2}{5}$ – $\frac{1}{10}$ in. long, linear.

* Culms long or short; rhizome tufted or stoloniferous. Leaves flat or complicate or involute, not terete nor polished, not specially rigid, never pungent-pointed.

† Rhizome tufted. Ligules reduced to a truncate rim.

Culms 6–36 in., usually stout. Leaves flat or concave, $\frac{1}{10}$ – $\frac{1}{4}$ in. broad. Panicle large; branches usually ternate or quinate. Spikelets $\frac{1}{4}$ – $\frac{1}{3}$ in. Flowering glumes minutely scaberulous, keel scabrid, callus and lower part of glume usually with a few crisped hairs 6. *P. anceps*.

Culms 4–12 in., slender. Leaves narrow, sometimes filiform. Panicle $1\frac{1}{2}$ –3 in.; branches usually binate. Spikelets $\frac{1}{2}$ – $\frac{1}{3}$ in. Flowering glumes as in *P. anceps* but smoother 7. *P. seticulmis*.

†† Rhizome creeping or stoloniferous; ligules short, truncate.

Culms 1–9 in. Leaves narrow, setaceous. Panicle $\frac{1}{2}$ –2 in., few-flowered. Spikelets $\frac{1}{8}$ – $\frac{1}{6}$ in. Flowering glumes usually smooth, callus and lower part of keel and margins with crisped hairs 8. *P. pusilla*.

Culms 6–18 in. Leaves narrow, complicate or flat, flaccid. Panicle 2–5 in., broad, lax. Spikelets $\frac{1}{3}$ in. Flowering glumes with the surface and nerves above minutely scabrid, keel sharply scabrid, callus and lower part of glume with long crisped hairs 9. *P. dipsacea*.

Culms 12–18 in. Leaves narrow, complicate, erect, rigid. Panicle 2–5 in., broad, lax. Spikelets $\frac{1}{4}$ in. Flowering glumes smooth above, lower portion of keel and margins villous, callus with silky hairs 10. *P. Cheesemanii*.

††† Rhizome creeping, stoloniferous; ligules a transverse band of short dense hairs.

Culms 12–24 in. Leaves rigid, erect. Panicle $1\frac{1}{2}$ –3 in., dense. Spikelets $\frac{1}{4}$ – $\frac{1}{3}$ in. Flowering glume prominently 5-nerved, surfaces scaberulous, keel sharply scabrid, callus and lower part of keel with sparse crisp hairs .. 11. *P. chathamica*.

** Culms tufted, strict, erect, smooth and polished. Leaves terete or nearly so, erect, rigid, acute or pungent-pointed.

† Ligules almost obsolete.

Culms 1–3 ft., forming dense tussocks. Panicle 2–9 in., lax. Flowering glumes prominently 5-nerved, callus and base of keel with a tuft of long crisped hairs .. 12. *P. caespitosa*.

†† Ligules long, hyaline, sheathing.

Culms 2–18 in. Leaves shorter than the culms. Panicle $\frac{1}{2}$ –3 in. Flowering glumes faintly 5-nerved, smooth or nearly so, callus with a tuft of crisped hairs 13. *P. Colensoi*.

Culms 2–6 in. Leaves imbricated, very short and rigid, with acicular points. Panicle $\frac{1}{2}$ –1 in., few-flowered. Flowering glumes villous with short silky hairs below the middle, minutely rough above 14. *P. acicularifolia*.

*** Culms $\frac{1}{2}$ –1 in., densely tufted and compacted, forming patches 2–6 in. across.

Leaves minute, $\frac{1}{8}$ – $\frac{1}{2}$ in. long. Panicle reduced to 1–3 spikelets 15. *P. pygmæa*.

C. Two outer glumes reaching more than half-way up the flowering glumes immediately above them. Flowering glumes broad, obtuse. Anthers small often minute, $\frac{1}{25}$ – $\frac{1}{15}$ in. long, oblong.

Culms 6–18 in., stout or slender, leafy throughout. Panicle 2–6 in., many-flowered. Spikelets $\frac{1}{6}$ – $\frac{1}{3}$ in., green or purplish-green. Flowering glumes prominently 5-nerved, glabrous or rarely with a tuft of hairs on the callus 16. *P. Kirkii*.

Culms 3–12 in., slender and delicate, leafy at the base. Panicle 1–3 in., few-flowered. Spikelets $\frac{1}{10}$ – $\frac{1}{8}$ in. long, silvery-brown. Flowering glumes faintly 5-nerved, silky with short white hairs 17. *P. Lindsayi*.

Culms 2–4 in., leafy throughout. Panicle lax, few-flowered. Spikelets 3–6, turgid, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, purplish-brown. Flowering glumes glabrous 18. *P. incrassata*.

Culms 1–5 in., leafy throughout. Panicle contracted, few-flowered. Spikelets compressed, $\frac{1}{10}$ – $\frac{1}{8}$ in., green tinged with purplish-red. Flowering glumes quite glabrous, margins white and membranous 19. *P. exigua*.

Culms 1–3 in., leafy at the base. Panicle contracted into an oblong head $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Spikelets 4–12, $\frac{1}{8}$ in. long, pale glaucous-green. Flowering glumes silky with short crisped hairs 20. *P. Maniototo*.

Culms 2–8 in., rigid. Leaves rough with minute asperities. Panicle $\frac{3}{4}$ –2 in. long, dense and spiciform, many-flowered. Spikelets $\frac{1}{8}$ in. Flowering glumes quite glabrous, margins white and membranous 21. *P. sclerophylla*.

D. Two outer glumes not reaching half-way up the flowering glumes immediately above them. Flowering glumes broadly oblong or ovate-oblong, obtuse or acute, glabrous. Anthers minute, $\frac{1}{80}$ – $\frac{1}{50}$ in., oblong.

Culms 3–14 in., slender, leafy, flaccid. Spikelets $\frac{1}{10}$ – $\frac{1}{8}$ in. Flowering glumes broadly oblong, obtuse, faintly 3–5-nerved 22. *P. imbecilla*.

Culms 6–12 in., slender, leafy, flaccid. Spikelets $\frac{1}{10}$ – $\frac{1}{8}$ in. Outer glumes very minute. Flowering glumes oblong-ovate, acute, prominently 3-nerved 23. *P. breviglumis*.

1. *P. foliosa*, Hook. f. *Handb. N.Z. Fl.* 338 (excl. var. b).—Often forming large tussocks. Culms densely tufted, 1–4 ft. high, $\frac{1}{3}$ – $\frac{2}{3}$ in. diam. at the base, stout, erect, leafy, compressed below. Leaves very numerous, subdistichous, usually exceeding the culms, 1–4 ft. long, $\frac{1}{8}$ – $\frac{3}{4}$ in. broad, gradually narrowed into acuminate points, flat, coriaceous, glabrous, minutely scabrid above, somewhat glaucous beneath; sheaths rather lax, broad, compressed, striate, glabrous; ligules short, membranous, entire or dentate. Panicle large, linear-oblong, dense, contracted, inclined or nodding, 3–10 in. long, 1–3 in. broad; rhachis stout, grooved, glabrous; branches suberect, much divided, slender, glabrous, multi-spiculate. Spikelets shortly pedicelled, much compressed, rather large, $\frac{1}{4}$ – $\frac{1}{3}$ in. long,

3-5-flowered. Two outer glumes slightly unequal, keeled, acuminate; the lower subulate-lanceolate, 1-nerved; the upper broader and larger, about $\frac{2}{3}$ the length of the whole spikelet, lanceolate, 3-nerved. Flowering glumes ovate-lanceolate, acuminate, incurved at the tip, prominently 5-nerved; callus, together with the back and margins for half their length, clothed with crisped silky hairs; upper portion of the glume scabrid. Palea $\frac{1}{3}$ shorter than the glume, linear-oblong, bifid at the tip.—*Buch. N.Z. Grasses*, t. 42. *Festuca foliosa*, *Hook. f. Fl. Antarct.* i. 99, t. 55.

STEWART ISLAND: Herekopere Island and headlands near the South Cape, *Kirk*! THE SNARES: *Kirk*! *Chapman*! AUCKLAND AND CAMPBELL ISLANDS: Abundant, *Hooker*, *Buchanan*! *Kirk*! *Chapman*! ANTIPODES ISLAND: *Kirk*! MACQUARIE ISLAND: *Fraser*, *Professor Scott*, *A. Humilton*!

Easily distinguished from all other New Zealand species by the great size, very broad flat leaves, and large dense panicle. It is closely allied to the Kerguelen Island *P. Cookii*, *Hook. f.*, and to the well-known tussock grass of the Falkland Islands and Fuegia, *P. flabellata*, *Hook. f.* (*Dactylis cæspitosa*, *Forst.*). The flowers seem to be partly if not altogether unisexual, most of the specimens that I have seen being females with the anthers much reduced in size.

2. *P. novæ-zealandiæ*, *Hack. in Trans. N.Z. Inst.* xxxv. (1903) 381.—Perennial, tufted, innovation-shoots intravaginal or mixed. Culms erect, 3-18 in. high, slender, glabrous, 3-noded, upper node about the middle of the culm. Leaves usually much shorter than the culms, 2-10 in. long, $\frac{1}{12}$ — $\frac{1}{4}$ in. broad, linear, suddenly acuminate at the tip, flat or those of the innovation-shoots complicate, erect, quite glabrous, finely striate; sheaths lax, compressed; ligules ovate, acuminate, often dentate. Panicle broadly ovate to ovate-oblong or linear-oblong, dense, nodding or more rarely erect, 1-4 in. long; rhachis smooth, terete; branches binate or ternate, once or twice divided, smooth, capillary. Spikelets pale-green or whitish-green, much compressed, elliptic-oblong, $\frac{1}{4}$ — $\frac{1}{3}$ in. long, 5-6-flowered. Two outer glumes slightly unequal, acuminate, glabrous; lower subulate-lanceolate, 1-nerved; upper longer and broader, about half as long as the whole spikelet or rather more, lanceolate, 3-nerved. Flowering glumes lanceolate, acuminate, often incurved at the tip, usually 5-nerved, but the intermediate nerve on each side faint and sometimes obsolete, callus with a tuft of crisped woolly hairs more than half as long as the glume, remainder of the glume glabrous, smooth. Palea $\frac{1}{3}$ shorter than the glume, linear-oblong, bidentate, pubescent on the keels.—*P. foliosa* var. b, *Hook. f. Handb. N.Z. Fl.* 338; *Buch. N.Z. Grasses*, t. 43. *Festuca foliosa*, *Hook. f. Fl. Nov. Zel.* i. 308 (not of *Fl. Antarct.*).

Var. *subvestita*, *Hack. l.c.*—Flowering glumes rather longer, clothed with crisp hairs in the lower $\frac{1}{3}$, exterior lateral nerves more prominent. Spikelets often tinged with violet.

NORTH ISLAND: Mount Hikurangi, *Petrie!* Mount Egmont, *Buchanan!* *T. F. C.*; Tatarua Mountains, *Buchanan!* *Townson!* SOUTH ISLAND, STEWART ISLAND: Abundant in damp alpine and subalpine localities. 2500–6500 ft.

Separated without any difficulty from *P. foliosa*, with which it was placed by Hooker, by the different habit, much smaller size, shorter narrower and smoother leaves, smaller and proportionately broader panicle, and less prominently nerved flowering glumes, which are less silky at the base, and almost smooth above.

3. *P. litorosa*, *Cheesem.*—Perennial, densely tufted, perfectly smooth and polished. Culms numerous, branched at the base, erect, quite glabrous, 6–24 in. high. Leaves usually longer than the culms, very narrow, linear-filiform, gradually narrowed upwards into an almost pungent point, closely involute, terete, rigid and coriaceous, faintly striate; sheaths long, tight, smooth; ligules ovate, membranous. Panicle rather small, 1–3 in. long, ovate to ovate-oblong or linear-oblong, rather dense, erect or inclined, sparingly branched; branches short, simple or divided, scaberulous. Spikelets much compressed, ovate-oblong, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, 3–7-flowered. Two outer glumes slightly unequal, keeled, not half as long as the spikelet, broadly lanceolate, acuminate, 3–5-nerved. Flowering glumes ovate-lanceolate, acuminate, keeled, prominently 5-nerved, sometimes with short crisped hairs on the callus and lower part of the keel, but frequently without them, the whole of the glume densely minutely scabrid. Palea about $\frac{1}{4}$ shorter than the glume, linear-oblong, bidentate, ciliate-scabrid on the keels. Stamens 3; anthers long, $\frac{2}{3}$ the length of the palea.—*Festuca scoparia*, *Hook. f. Fl. Antarct.* i. 98; *Fl. Nov. Zel.* i. 308; *Handb. N.Z. Fl.* 341; *Buch. N.Z. Grasses*, t. 55A.

SOUTH ISLAND: Otago—Abundant on the cliffs of the east and southern coasts, from Port Chalmers southwards, *Lyall, Kirk!* *Petrie!* *H. J. Matthews!* STEWART ISLAND, THE SNARES, AUCKLAND and CAMPBELL ISLANDS, ANTIPODES ISLAND: Plentiful on rocks near the sea.

A very distinct species, with a good deal of the habit and appearance of small states of *Festuca littoralis*, which no doubt induced Sir J. D. Hooker to place it in the same genus. But it has the keeled flowering glumes and punctiform hilum of *Poa*; and, as Professor Hackel has pointed out to me, must be transferred to that genus. As there is already a *Poa scoparia* (*Kunth, Rev. Gram.* ii. 535) a new name is required. Hooker describes the flowering glume as “basi longe villosa-barbata,” but it is frequently quite free from hairs.

4. *P. ramosissima*, *Hook. f. Fl. Antarct.* i. 101.—Culms densely tufted, decumbent at the base for 6–12 in., simple, brown, rigid, many-noded, naked or clothed with the remains of the old leaves; upper portion ascending and much fasciculately branched; branches slender, flaccid, leafy, 2–4 in. long. Leaves longer than the culms, narrow, $\frac{1}{12}$ – $\frac{1}{6}$ in. broad, flat, flaccid, quite smooth and glabrous, obsoletely nerved; sheaths long, slender, striate; ligules oblong, truncate. Panicle narrow, erect, green, 1–2 in. long, $\frac{1}{3}$ in. broad;

rhachis slender, smooth; branches short, erect, $\frac{1}{4}$ in. long, quite smooth and glabrous, bearing 3-4 shortly pedicelled spikelets. Spikelets compressed, $\frac{1}{5}$ - $\frac{1}{4}$ in. long, 3-5-flowered. Two empty glumes slightly unequal, about half as long as the spikelet, lanceolate, acuminate, glabrous; the lower 1-nerved; the upper broader, 3-nerved. Flowering glumes lanceolate, acuminate, keeled, 5-nerved with the lateral nerves faint, smooth and glabrous, callus at the base glabrous or with a tuft of crisped woolly hairs. Palea $\frac{1}{4}$ shorter than the flowering glume. Anthers long, linear, $\frac{2}{3}$ as long as the palea.—*Handb. N.Z. Fl.* 338.

AUCKLAND AND CAMPBELL ISLANDS: Abundant near the sea, *Sir J. D. Hooker*!

Of this species I have only seen a single panicle from one of Hooker's Campbell Island specimens, and in default of further information, the above description is based upon that given in the "Flora Antarctica." Hooker remarks that "this is a very abundant grass in both groups of islands, and of a most singular habit of growth. The culms are invariably prostrate and quite simple for a foot or so, when they suddenly ascend and divide into many short leafy branches, each bearing a panicle of flowers. It forms a copious, soft, green herbage, especially on the banks near the sea, always throwing its long culms over the edges of the cliffs, which are thus fringed with a delicate festoon of green."

5. **P. polyphylla**, *Hack. in Trans. N.Z. Inst.* xxxv. (1903) 383.—Tufted; innovation-shoots extravaginal. Culms erect or decumbent at the base and then ascending, often much branched, many-noded, compressed, glabrous, wiry, 6-18 in. high. Leaves numerous, sheathing the culm, distichously spreading, 4-10 in. long, about $\frac{1}{10}$ in. broad, flat or complicate, lower portion smooth, upper part scabrid on the margins and keel; sheaths overlapping, tight, compressed, grooved; ligules reduced to a narrow truncate rim. Panicle 1-3 in. long by $\frac{1}{2}$ -1 in. broad, oblong, dense, contracted; branches usually binate, short, erect, divided, spiculate almost to the base, more or less scabrid. Spikelets oblong, compressed, 4-5-flowered, $\frac{1}{5}$ - $\frac{1}{4}$ in. long. Two outer glumes unequal, lanceolate, acuminate, 1-nerved, sharply scabrid along the keel, the upper the longer, rather more than half the length of the spikelet. Flowering glumes lanceolate, sharply acuminate, almost mucronate, keeled, prominently 5-nerved, minutely scabrid on the surface and nerves and sharply scabrid along the keel, callus and lower part of keel with long crisped woolly hairs. Palea slightly shorter than the glume, linear-oblong, scabrid on the keels. Anthers long.

KERMADEC ISLANDS: Abundant on Sunday and Macaulay Islands, chiefly near the sea, *T. F. C., Miss Shakespeare*!

Distinguished by the branching habit, distichously spreading leaves, short contracted panicle, and narrow acuminate flowering glumes, which are sharply scabrid on the keel, and scaberulous on the surfaces and veins.

6. **P. anceps**, *Forst. Prodr.* n. 43.—Perennial, very variable; innovation-shoots extravaginal. Culms tufted, often branched at the base, stout, compressed, glabrous, leafy, 6–36 in. high or even more. Leaves longer or shorter than the culms, subdistichous, 3–18 in. long, $\frac{1}{10}$ – $\frac{1}{4}$ in. broad, acute or acuminate, rather coriaceous, flat or concave, smooth on both surfaces or the margins slightly scabrid near the apex; sheaths compressed, grooved; ligules a short truncate rim. Panicle very variable, 2–12 in. long, 1–5 in. broad, lanceolate to oblong or ovate, effuse or contracted, rather dense or open, inclined or erect; rhachis smooth or scaberulous; branches short or long, suberect or spreading, 2 or 3 or more from one node, once or twice divided; branchlets capillary, scaberulous. Spikelets ovate-oblong, compressed, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, 3–6-flowered. Two outer glumes unequal, not half the length of the spikelet, but reaching $\frac{3}{4}$ -way up the flowering glume above them, lanceolate, acuminate, 3-nerved, scabrid on the keel and sides or almost glabrous. Flowering glumes oblong to oblong-ovate, obtuse or subacute, keeled, prominently 5-nerved, minutely scaberulous on the surface and nerves or almost smooth, keel usually scabrid, callus and lower part of keel with a few crisped hairs or almost glabrous. Palea almost as long as the flowering glume, linear-oblong, minutely ciliate-scabrid on the keels. Anthers long.—*Hook. f. Fl. Nov. Zel.* i. 306; *Handb. N.Z. Fl.* 339; *Buch. N.Z. Grasses*, t. 44. *P. australis*, *A. Rich. Fl. Nouv. Zel.* 141; *A. Cunn. Precur.* n. 262; *Raoul, Choix*, 39 (not of *R. Br.*).

Var. **condensata**, *Cheesem.*—Culms 4–18 in. high, often overtopped by the leaves. Panicle shorter and much more compact, dense-flowered. Spikelets rather smaller, 2–4-flowered. Glumes smoother, hardly scaberulous.

Var. **gracilis**, *Cheesem.*—Culms slender, 4–18 in. high. Leaves narrow, often involute. Panicle lax; branches few, 2–3 from each node or solitary; spikelets fewer, towards the tips of the branchlets, smaller, 2–5-flowered. Glumes smoother. This appears to connect the type with *P. seticulmis*.

NORTH AND SOUTH ISLANDS: The typical form throughout the whole of the North Island, ranging from sea-level to 3500 ft., apparently rare and local in the South Island, but recorded from Marlborough and Nelson, and extending along the West Coast to the south of Westport. Var. *condensata* not uncommon as far as Canterbury; var. *gracilis* to Foveaux Strait.

What I consider to be the typical state of this variable plant includes the two varieties *elata* and *foliosa* of the Handbook, and can be distinguished by the tall stout culms often branching at the base, broad and flat subdistichous smooth leaves, large usually lax panicle, and numerous rather large spikelets, with subacute flowering glumes prominently nerved and usually more or less finely scaberulous. But it runs on all sides into numerous varieties exceedingly difficult to define, if, indeed, they are capable of exact circumscription.

7. **P. seticulmis**, *Petrie in Trans. N.Z. Inst.* xxxiv. (1902) 391.—Culms tufted, branched at the base, very slender, erect, smooth and glabrous, 4–12 in. high. Leaves shorter or longer than the culms, very narrow, usually involute and filiform, rarely slightly

broader and flat, erect, smooth, striate; sheaths pale, membranous, grooved; ligules reduced to a narrow membranous ciliolate rim. Panicle $1\frac{1}{2}$ –3 in. long, ovate to oblong, lax, few-flowered; rachis capillary, scaberulous above; branches few, in distant pairs or the upper solitary, spreading or suberect, sparingly branched, capillary, scaberulous. Spikelets few at the tips of the branchlets, oblong, $\frac{1}{6}$ – $\frac{1}{5}$ in. long, 3–5-flowered. Two outer glumes slightly unequal, about half the length of the spikelet or less, lanceolate, acute, 3-nerved, smooth or nearly so. Flowering glumes oblong-ovate, obtuse or subacute, 5-nerved, smooth or minutely scaberulous on the keel, a few crisped hairs on the callus and lower part of the back. Palea almost as long as the glume, ciliate on the keels. Anthers long, linear.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in dry places throughout. Sea-level to 2500 ft.

What may be taken as the typical form of this species is abundant on sandy soil near the sea in the northern part of the North Island, and from its very slender filiform culms and leaves and lax few-flowered panicle presents a very distinct appearance. But, as Mr. Petrie remarks, there is a widely spread inland state that cannot be separated from it by any characters of importance, but which gradually varies into small and slender states of *P. anceps*, the var. *gracilis* of that plant forming a direct connection between the two species.

8. *P. pusilla*, Berggr. in *Minneskr. Fisiog. Sällsk. Lund*. (1877) 31, t. 7, f. 35–40.—Rhizome long, creeping and rooting. Culms variable in size, often much dwarfed, 1–9 in. high, erect or ascending, slender, smooth and glabrous, striate. Leaves much shorter than the culms, subdistichous, narrow, involute, setaceous; sheaths pale, compressed, grooved; ligules extremely short, reduced to a mere rim. Panicle variable in size, $\frac{1}{2}$ –2 in. long, broadly ovate, lax, few-flowered; branches few, slender, capillary, spreading, in depauperated states reduced to 2 or 3, each with a single spikelet, in large forms 4–8, with 1–4 spikelets at the tip. Spikelets pale-green, ovate, compressed, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, 2–5-flowered. Two outer glumes subequal, about half as long as the spikelet, oblong-ovate to oblong-lanceolate, acute, 3-nerved, smooth or scabrid on the keel above. Flowering glumes oblong-ovate, obtuse, 5-nerved, smooth or rarely minutely scaberulous on the keel, callus and lower part of keel and margins with long crisped woolly hairs. Palea about $\frac{3}{4}$ the length of the glume, silky on the keels. Anthers long, linear.—*P. anceps* var. *minima*, Buch. *N.Z. Grasses*, t. 46F.

SOUTH ISLAND: Wet places in mountain districts, from the Wairau Valley, Nelson, to the south of Otago. STEWART ISLAND: *Kirk*! Sea-level to 5000 ft.

I am greatly puzzled with this species. Forms very closely resembling Berggren's plate and description are not uncommon in subalpine localities in the South Island, but they appear to pass insensibly into a larger lowland state, with a more developed panicle and larger spikelets. This in its turn approaches so near to *P. seticulmis* that it is difficult to draw a strict line of demarcation between the two plants.

9. *P. dipsacea*, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 271.—Culms erect from an often long and branched creeping and rooting base, stout or slender, smooth, leafy, 6–18 in. high. Leaves usually shorter than the culms, narrow, involute or complicate, quite smooth and glabrous, deeply striate; sheaths rather loose, pale, deeply grooved; ligules short, broad, submembranous. Panicle 2–5 in. long, broadly ovate, lax, few-flowered; rhachis smooth; branches usually in distant pairs, simple or forked, smooth, capillary, bearing few large spikelets towards the tips. Spikelets long-pedicelled, elliptic-ovate, compressed, greenish-brown, about $\frac{1}{3}$ in. long, 4–8-flowered. Two outer glumes unequal, almost as long as the flowering glumes immediately above them, lanceolate, acute, membranous, smooth or finely scabrid on the upper part of the keel. Flowering glumes ovate, obtuse or subacute, rather membranous, prominently 5-nerved, callus and lower part of the keel and margins with long silky hairs, upper part of keel sharply scabrid, surface and nerves in the upper half minutely scaberulous. Palea shorter than the glume keels ciliate. Anthers long, linear.

SOUTH ISLAND: Nelson—Raglan Range, *T. F. C.* Canterbury—Wet places near the sources of the Broken River, *Petrie!* *T. F. C.*; Craigieburn Mountains, *Cockayne!* 3000–5000 ft.

This seems to be a distinct species, recognised without much difficulty by the long decumbent bases of the culms, very lax few-flowered panicle, and large spikelets clustered at the tips of the branchlets. Depauperated states approach *P. pusilla*, but are easily distinguished by the larger spikelets and more distinctly nerved scaberulous flowering glumes.

10. *P. Cheesemanii*, *Hack. in Trans. N.Z. Inst.* xxxv. (1903) 383.—Perennial, hardly tufted; rhizome with creeping stolons furnished with leafless scales. Culms erect or decumbent at the base, slender, smooth, terete, 3-noded, the upper node about half-way up the culm, 12–18 in. high. Leaves much shorter than the culms, 2–6 in. long, about $\frac{1}{2}$ in. broad, rigid, erect, obtuse at the tip, more or less complicate when dry; sheaths shorter than the internodes, subcompressed, keeled in the upper part, glabrous; ligules short, truncate. Panicle ovate, lax, spreading, 2–5 in. long; rhachis smooth, more or less flexuose above; lower branches ternate, upper binate or solitary, slender, almost capillary, lower $\frac{2}{3}$ undivided and smooth, towards the tip bearing a few unispiculate branchlets. Spikelets elliptic, often tinged with red, rather more than $\frac{1}{4}$ in. long, 5–6-flowered. Two outer glumes unequal, $\frac{3}{4}$ the length of the flowering glumes above them or even more, oblong-lanceolate, acute, 3-nerved, quite smooth. Flowering glumes oblong-ovate, subacute, prominently 5-nerved, callus clothed with long crisped woolly hairs half the length of the glume, keel and nerves near the base sparingly villous, remainder of the glume smooth and glabrous. Palea almost as long as the glume, linear-oblong, scabrid on the keels. Anthers linear, about $\frac{1}{2}$ in. long.

SOUTH ISLAND: Nelson—Lake Tennyson, *T. F. C.*; near Westport, *Townson*!

Professor Hackel remarks of this species that it is allied to *P. anceps*, but differs markedly in the stoloniferous rhizome, the rhizome of *P. anceps* being invariably tufted and without stolons. The spikelets are also broader, the two outer glumes longer in proportion and smoother, and the flowering glumes much more hairy at the base and smoother above. *P. dipsacea* differs in the more flaccid habit, larger spikelets, and in the flowering glumes being scabrous above.

11. *P. chathamica*, *Petrie in Trans. N.Z. Inst.* xxxiv. (1902) 394.—Rhizome long, wiry, creeping and rooting among *Sphagnum*, &c. Culms 1–2 ft. high, often decumbent and branched at the base, erect above, rather rigid, smooth, leafy. Leaves usually shorter than the culms, narrow, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad, erect, rather coriaceous, tapering to a stiff acute point, flat or concave, smooth, striate; sheaths compressed, lax, grooved; ligules a transverse band of short stiff white hairs. Panicle $1\frac{1}{2}$ –3 in. long, linear-oblong to ovate-oblong, rather dense; branches few, usually binate, short, slender, capillary, scabrid-ciliate. Spikelets ovate or oblong-ovate, compressed, pale-green or purplish, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, 4–5-flowered. Two outer glumes slightly unequal, about half the length of the spikelet, oblong-lanceolate, acute, 3-nerved, scabrid on the keel. Flowering-glumes oblong-ovate, obtuse or subacute, prominently 5-nerved, minutely scaberulous on the surfaces and nerves, keel usually strongly scabrid, callus and lower part of keel and margins with sparse crisped woolly hairs. Palea about as long as the glume, bidentate, strongly ciliate on the keels. Anthers long, linear.

CHATHAM ISLANDS: Abundant in *Sphagnum* swamps, *Cox and Cockayne*!

Closely allied to *P. anceps*, but sufficiently distinct in the creeping rhizome, more coriaceous erect leaves, ligule composed of short stiff hairs, and short dense panicle with few branches and rather large spikelets.

12. *P. cæspitosa*, *Forst. Prodr.* n. 498.—Culms densely tufted, forming compact tussocks, pale yellowish-green, slender, erect, smooth and polished, 1–3 ft. high. Leaves longer or shorter than the culms, very narrow, often filiform, usually with the margins strongly involute so that the leaf is nearly terete, rarely flat, strict, wiry, erect, pungent, smooth and polished; sheaths long, smooth and shining; ligules almost obsolete, reduced to a narrow transverse rim. Panicle 2–9 in. long, broad or narrow, lax; branches few, in distant whorls or clusters, or in small specimens binate or solitary, sparingly divided, spreading, capillary, scabrid. Spikelets pale-green, about $\frac{1}{4}$ in. long, 3–6-flowered. Two outer glumes unequal, about $\frac{3}{4}$ the length of the flowering glumes above them, ovate-lanceolate, acute, membranous, 3-nerved, smooth or scabrid on the keel. Flowering glumes oblong-lanceolate to oblong-ovate, sub-acute or obtuse, prominently 5-nerved, minutely scaberulous, callus

and base of keel with a tuft of long crisped silky hairs. Palea rather shorter than the glume, minutely ciliate on the keels. Anthers linear, about $\frac{1}{10}$ in. long.—*A. Cunn. Precur.* n. 264; *Raoul, Choix*, 39; *Benth. Fl. Austral.* vii. 651. *P. australis* var. *lævis*, *Hook. f. Handb. N.Z. Fl.* 339; *Buch. N.Z. Grasses*, t. 47. *P. lævis* var. *filifolia*, *Hook. f. Fl. Nov. Zel.* i. 307.

Var. *leioclada*, *Hack. MSS.*—Panicle-branches smooth. Spikelets larger, $\frac{1}{3}$ in. long or more.

Var. *australis*, *Benth. Fl. Austral.* vii. 653.—Leaves rough and scabrous. Panicle very lax and spreading. Perhaps naturalised.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: The typical state abundant from the Upper Thames and Waikato southwards. Var. *leioclada*: Mount Egmont, *Petrie*! near Westport, *Townson*! Var. *australis*: Marua, near Whangarei, *H. Hawkins*! near Auckland, *T. F. C.* Sea-level to 4000 ft. "*Tussock Grass.*"

Also in Australia and Tasmania. The most abundant grass through wide districts in the South Island, also plentiful in the elevated central portions of the North Island. Unfortunately, it is not relished by stock, and is seldom eaten, save in the absence of better food.

13. *P. Colensoi*, *Hook. f. Handb. N.Z. Fl.* 340.—Culms densely tufted, branched at the base, slender, erect, quite smooth, pale whitish-green, 2–14 in. high. Leaves shorter than the culms, very narrow, filiform, the margins so strongly involute that the leaf is almost terete, acute, erect or curved, rigid and wiry, quite smooth, polished; sheaths long, pale, rigid, grooved, the lower persistent long after the blades have fallen; ligules very large and long, sheathing, membranous, hyaline. Panicle $\frac{1}{2}$ –2 in. long, broadly ovate, lax, few-flowered; branches few, usually binate, slender, capillary, scabrid, bearing 1–3 spikelets at the tip. Spikelets pale-green, compressed, $\frac{1}{5}$ – $\frac{1}{4}$ in. long, 3–6-flowered. Two outer glumes unequal, reaching about $\frac{2}{3}$ -way up the flowering glumes above them, oblong-lanceolate, acute, 3-nerved, the lateral nerves short and faint, smooth. Flowering glumes oblong-ovate, subacute, faintly 5-nerved, smooth or nearly so, keel and surfaces in the lower half very sparsely silky-pubescent or quite glabrous, with no long tuft of crisped hairs as in *P. caespitosa*. Palea slightly shorter than the glume. Anthers long, linear, about $\frac{1}{12}$ in. long.—*Buch. N.Z. Grasses*, t. 48B.

Var. *intermedia*, *Cheesem.*—Taller, with more of the tussocky habit of *P. caespitosa*, 9–18 in. high. Ligules as in the typical state. Panicle larger, 2–3 in. long. Spikelets more numerous, larger, $\frac{1}{3}$ in. long, but flowering glumes as in the type.—*P. intermedia*, *Buch. N.Z. Grasses*, t. 48A.

NORTH ISLAND: Mountainous localities and dry elevated plains of the interior, from Moehau (Cape Colville) southwards, but rare and local to the north of Lake Taupo. (South ISLAND, STEWART ISLAND: Plentiful throughout. Usually from 1000 to 5000 ft., but descends almost to sea-level in the south of Otago, and ascends to over 7000 ft. on Mount Egmont.

A very remarkable species. I have reunited Mr. Buchanan's *P. intermedia* with it, there being no differences save those of size and habit, in which respect the two forms pass into one another by insensible gradations. Professor Hackel also takes the same view. Small states of *P. cæspitosa* can always be distinguished by the almost obsolete ligules and by the long crisped hairs on the callus of the flowering glume.

P. Colensoi is one of the most important of the indigenous pasture-grasses. It is eaten by all kinds of stock, and is a specially valuable sheep-grass in mountain districts.

14. ***P. acicularifolia***, *Buch.* *N.Z. Grasses*, t. 49A. — Much branched at the base, forming compact leafy glaucous-green patches 2–6 in. across; branches short, curved, densely leafy. Culms very slender, almost filiform, smooth, naked for the greater part of their length, 2–6 in. high. Leaves imbricating on the branches, crowded, short, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, involute and terete, curved, rigid, smooth, suddenly narrowed into an acute or acicular tip; sheaths short, pale, lax; ligules very long, sheathing, deeply 2-fid, membranous, hyaline, decurrent along the margins of the sheath. Panicle $\frac{1}{2}$ –1 in. long, broadly ovate, lax, of 3–10 spikelets; branches few, slender, capillary, scabrid. Spikelets compressed, about $\frac{1}{4}$ in. long, 3–6-flowered. Two outer glumes unequal, oblong-lanceolate, acute, 3-nerved, smooth or slightly scabrid above. Flowering glumes oblong-ovate, subacute, 5-nerved, densely villous with short silky hairs below the middle, minutely rough above, callus sometimes with a tuft of crisped hairs. Palea almost as long as the glume, linear-oblong, silky on the keels. Anthers long, linear, about $\frac{1}{12}$ in. long.

SOUTH ISLAND: Nelson—Mount Arthur, *A. Mackay*! Canterbury—Limestone rocks in the Broken River Basin, *Enys*! *Kirk*! *T. F. C.* 2000–4000 ft.

Very closely allied to *P. Colensoi*, and chiefly distinguished by the peculiar habit, short rigid acicular leaves, and densely silky flowering glumes.

15. ***P. pygmæa***, *Buch.* *N.Z. Grasses*, t. 50A. — Small, much branched, very densely tufted, forming compact rigid patches 2–4 in. diam. and $\frac{1}{2}$ –1 in. high. Culms very short, clothed throughout with densely imbricating leaves. Leaf-blades very short, $\frac{1}{8}$ – $\frac{1}{3}$ in. long, extremely rigid and coriaceous, folded, about $\frac{1}{20}$ in. broad when spread out, subacute, strongly grooved, quite smooth; ligules broad, thin. Panicle reduced to 1–3 spikelets; pedicels short, smooth. Spikelets about $\frac{1}{8}$ in. long, brownish-green, often tinged with purple, 3–5-flowered. Two outer glumes slightly unequal, oblong-lanceolate, acute, 3-nerved, quite smooth. Flowering glumes ovate, subacute, faintly 5-nerved, smooth, lower half clothed with short white silky hairs. Palea $\frac{1}{4}$ shorter than the glume, ciliate on the keels. Anthers long, linear.

SOUTH ISLAND: Otago—Summit of Mount Pisa, altitude 6000 ft., *Petrie*!

A very remarkable little species, quite unlike any other.

16. **P. Kirkii**, *Buch. N.Z. Grasses*, t. 51B.—Culms tufted, erect, compressed, smooth, leafy, 3-5-noded, 6-18 in. high. Leaves much shorter than the culms, erect, 1-4 in. long, $\frac{1}{15}$ - $\frac{1}{6}$ in. broad, linear, gradually tapering to an acuminate point, flat, smooth or the margins scabrid above, striate; sheaths compressed, grooved, the uppermost long, often sheathing the greater part of the culm; ligules long, membranous, erect. Panicle oblong or oblong-ovate, lax, erect, 2-5 in. long; rhachis slender, flexuous, smooth or minutely scaberulous; branches in alternate pairs or in alternate fascicles of 3-5, unequal, slender, sparingly divided, smooth or scaberulous. Spikelets elliptic-oblong, compressed, green or purplish-green, $\frac{1}{6}$ - $\frac{1}{4}$ in. long, 3-5-flowered. Two outer glumes unequal, $\frac{1}{2}$ - $\frac{2}{3}$ the length of the whole spikelet, oblong-lanceolate, acute, 3-nerved, smooth or scabrid along the keel. Flowering glumes oblong-ovate, obtuse, prominently 5-nerved, smooth or minutely scabrid on the keel and nerves above, glabrous or rarely with a tuft of crisped hairs on the callus. Palea about $\frac{1}{4}$ shorter than the glume, linear-oblong, ciliate on the keels. Anthers linear-oblong, $\frac{1}{20}$ in. long.—*P. purpurea*, *Kirk in Trans. N.Z. Inst.* ix. (1877) 500 (*name only*).

Var. **Mackayi**, *Hack. MSS.*—Taller and stouter; leaves often $\frac{1}{4}$ in. broad. Spikelets larger, $\frac{1}{3}$ in. long. Flowering glumes often with a tuft of long crisped hairs on the callus. Anthers $\frac{1}{15}$ in. long.—*P. Mackayi*, *Buch. N.Z. Grasses*, t. 50A.

Var. **Collinsii**, *Hack. MSS.*—Slender, pale-green, laxly tufted, 1-2 ft. high; nodes of the culm usually naked. Panicle 3-6 in. long, very lax; branches long, slender. Spikelets as in the type, but rather larger.—*P. Collinsii*, *Kirk ex Petrie in Trans. N.Z. Inst.* xxviii. (1896) 589 (*name only*).

NORTH ISLAND: Mount Egmont, *Petrie! T. F. C.*; Tararua Range, *H. H. Travers! T. P. Arnold!* SOUTH ISLAND: Abundant in subalpine localities throughout. Var. *Collinsii*: Mount Fyfe (Marlborough), *Kirk!* Hooker Valley, *T. F. C.* 2000-5000 ft.

A variable plant. Buchanan's *P. Mackayi* looks different at first sight, from its larger spikelets and broader leaves, but is connected with the type by intermediate forms. On the Mount Arthur Plateau, Nelson, the two varieties can be seen to merge into one another. *P. Collinsii* is a taller and more slender plant, with a larger and laxer panicle, but the structure of the spikelets is the same as in the type. *P. Kirkii* is a valuable grass for all kinds of stock in cool elevated localities, and is well worth cultivation.

17. **P. Lindsayi**, *Hook. f. Handb. N.Z. Fl.* 340.—Culms numerous, densely tufted, very slender, erect, quite smooth, leafy at the base, naked above, 3-12 in. high. Leaves much shorter than the culms, $\frac{1}{2}$ -3 in. long, very narrow, flat or involute, soft and flaccid, quite smooth, pale-green or bluish-green; sheaths short or the upper alone long, narrow, grooved; ligules oblong, membranous, hyaline. Panicle broadly ovate or oblong, erect, lax, 1-4 in. long; rhachis slender, smooth; branches rather distant, binate or ternate, spreading, very slender, capillary, smooth or scaberulous, simple or sparingly divided, bearing a few spikelets towards the tip. Spike-

lets $\frac{1}{10}$ – $\frac{1}{8}$ in. long, ovate, brownish-green or silvery-brown, 4–6-flowered. Two outer glumes unequal, about $\frac{1}{2}$ as long as the spikelet, oblong-ovate, subacute, 3-nerved, membranous. Flowering glumes broadly oblong, obtuse, faintly 5-nerved, silky throughout with short hairs, but no tuft of crisped hairs on the callus; margins white, membranous. Palea slightly shorter than the glume, ciliate on the keels. Anthers small, oblong, about $\frac{1}{40}$ in. long.—*Buch. N.Z. Grasses*, t. 52.

NORTH ISLAND: Hawke's Bay—Ruataniwha Plains, *H. Tryon!* SOUTH ISLAND: Not uncommon from the south of Nelson to Foveaux Strait. Sea-level to 5000 ft.

A pretty and distinct species, easily recognised by its small size and slender delicate habit, lax panicle, small silvery-brown spikelets, and faintly nerved silky flowering glumes. Hooker describes the flowering glumes as glabrous and nerveless, but I do not find them so.

18. *P. incrassata*, *Petrie in Trans. N.Z. Inst.* xxxiv. (1902) 394.—Culms small, densely tufted, quite smooth and glabrous, leafy, 2–4 in. high. Leaves equalling or sometimes overtopping the culms, erect or slightly spreading, slender, smooth, flaccid, very narrow, almost setaceous, complicate when dry; sheaths rather lax, almost as long as the blade, grooved; ligules short, membranous, truncate. Panicle $\frac{1}{2}$ –1 in. long, lax, of 3–6 spikelets on rather long smooth pedicels. Spikelets $\frac{1}{8}$ – $\frac{1}{6}$ in. long, broadly oblong, rather turgid, purplish-brown, 3–4-flowered. Two outer glumes subequal, about $\frac{1}{2}$ the length of the flowering glumes immediately above them, oblong, obtuse, 3-nerved, quite smooth. Flowering glumes broadly oblong, obtuse, prominently 5-nerved, quite smooth and glabrous. Palea almost as long as the glume, linear-oblong, minutely ciliate on the keels. Anthers oblong, minute, about $\frac{1}{50}$ in. long.

AUCKLAND ISLANDS: *F. R. Chapman!*

I have seen very few specimens of this species, and the above description will probably require modification when a larger series is obtained. It appears to be nearest to *P. exigua*, but the panicle is much more lax, the spikelets larger and more turgid, and the outer glumes are much shorter.

19. *P. exigua*, *Hook. f. Handb. N.Z. Fl.* 338.—Culms densely tufted, small, slender, quite smooth and glabrous, leafy, 1–5 in. high. Leaves numerous, shorter than the culms or rarely equalling them, $\frac{1}{2}$ –3 in. long, very narrow, involute, setaceous, erect, soft and flaccid, smooth; sheaths lax, thin, grooved; ligules short, white, membranous. Panicle small, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, rarely more, narrow, contracted, usually dense-flowered; branches few, short, erect. Spikelets few or many, green tinged with purplish-red, ovate, small, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, 2–3-flowered. Two outer glumes unequal, membranous, minutely scabrid on the upper part of the keel; lower oblong-lanceolate, acute, 1-nerved; upper larger and broader, $\frac{3}{4}$ the

length of the whole spikelet, oblong, obtuse, 3-nerved. Flowerin glumes broadly oblong with white membranous margins, obtuse, 5-nerved, smooth or minutely scaberulous on the keel above, quite glabrous at the base. Palea linear-oblong, glabrous. Anthers oblong, minute, about $\frac{1}{50}$ in. long.—*Buch. N.Z. Grasses*, t. 50B.

SOUTH ISLAND: Otago—Lake district, *Hector* and *Buchanan*; Mount Pisa, *Hector* Mountains, Mount Cardrona, *Petrie*! Humboldt Mountains, *Cockayne*! 3500–6000 ft.

20. **P. Maniototo**, *Petrie in Trans. N.Z. Inst.* xxii. (1890) 443.—Culms forming small compact tufts, slender, leafy below, naked and filiform above, smooth and glabrous, 1–3 in. high. Leaves much shorter than the culms, pale glaucous-green; blade $\frac{1}{4}$ – $\frac{3}{4}$ in. long, very narrow, filiform, involute and almost terete, grooved down the back, obtuse at the tip; sheaths broad, pale, membranous, grooved; ligules long, broad, hyaline, often bifid or irregularly lacerate. Panicle reduced to an oblong spike-like head $\frac{1}{4}$ – $\frac{1}{3}$ in. long of 4–12 spikelets. Spikelets pale glaucous-green, about $\frac{1}{6}$ in. long, ovate, 4–7-flowered. Two outer glumes subequal, ovate-oblong, acute, the lower 1-nerved, the upper 3-nerved with the lateral nerves faint. Flowering glumes ovate-oblong, obtuse, faintly 3–5-nerved, the lateral nerves sometimes obsolete, silky all over with very short crisped hairs. Palea shorter than the glume, linear-oblong, silky on the keels. Anthers oblong, very minute, about $\frac{1}{75}$ in. long.

SOUTH ISLAND: Canterbury—Broken River Basin, Mackenzie Plains, *T. F. C.* Otago—Dry plains in the interior, Kurow, Maniototo, Bendigo, Mount Pisa, *Petrie*! Lake Wanaka, *Kirk*! 1200–3000 ft.

21. **P. sclerophylla**, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 30.—Forming small dense tufts. Culms stout, erect, rigid, compressed, leafy, 2–8 in. high. Leaves numerous towards the base of the culms and sheathing their whole length, much shorter than them, glaucous or greenish-grey, everywhere rough with minute projections; blade $\frac{1}{2}$ –2 in. long, narrow, folded, $\frac{1}{16}$ – $\frac{1}{8}$ in. broad when spread out, rigid and coriaceous, acute or almost pungent, straight or curved, strongly grooved, quite glabrous; sheaths broader than the blade, pale, compressed, the upper 1 or 2 very long and sheathing the culm; ligules rather long, membranous. Panicle $\frac{3}{4}$ –2 in. long, very narrow, contracted, dense, spiciform, pale whitish-green; branches numerous, short, erect. Spikelets numerous, small, about $\frac{1}{8}$ in. long, 2–4-flowered. Two outer glumes subequal, about $\frac{2}{3}$ the length of the whole spikelet, oblong-lanceolate, acute, 3-nerved, the lateral nerves faint. Flowering glumes broadly oblong, obtuse, 5-nerved, margins white and membranous, surfaces very minutely rough, quite glabrous. Palea linear-oblong, glabrous. Anthers oblong, small, about $\frac{1}{40}$ in. long. Ripe grain adherent to the palea.—*P. albida*, *Buch. N.Z. Grasses*, t. 50c. *P. anceps* var. *alpina*, *Hook. f. Handb. N.Z. Fl.* 339.

SOUTH ISLAND: Probably not uncommon on dry shingle slopes in alpine localities. Nelson—Mount Percival, *T. F. C.*; Mount Captain, *Kirk*. Canterbury—Mount Torlesse, *Berggren*, *Petrie*! mountains above the Broken River, *T. F. C.*; Mount Dobson and Mount Darwin, *Haast*. Otago—Mount St. Bathans, Mount Ida, Mount Kyeburn, *Petrie*! 3500–6000 ft.

A very peculiar and distinct little species, quite unlike any other.

22. *P. imbecilla*, *Forst. Prodr.* n. 499 (*name only*).—Culms tufted, branched and decumbent at the base, ascending or erect above, weak, very slender, often filiform, quite smooth and glabrous, leafy, 3–14 in. high. Leaves shorter than the culms, very narrow, $\frac{1}{30}$ – $\frac{1}{15}$ in. broad, flat, flaccid; sheaths narrow, smooth, grooved, the upper often long; ligules rather long, membranous. Panicle very lax and slender, 1–5 in. long; branches in alternate fascicles of 3–5 or in small specimens binate or solitary, long, spreading, capillary, minutely scaberulous. Spikelets on long pedicels, small, green, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, laxly 2–6-flowered. Two outer glumes unequal, often small, from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the flowering glumes immediately above them, ovate or ovate-oblong, obtuse or subacute, 3-nerved. Flowering glumes often remote, oblong or broadly oblong, obtuse, faintly 3-nerved, or occasionally 5-nerved with the intermediate nerve on each side indistinct, smooth and glabrous, or slightly scabrid on the keel and sometimes on the nerves above, no tuft of hairs on the callus. Palea about $\frac{3}{4}$ the length of the glume, linear-oblong, ciliate on the keels. Anthers oblong, minute, about $\frac{1}{60}$ in. long.—*Spreng. Fl. Hal. Mant.* i. 33; *A. Cunn. Precur.* n. 263; *Raoul, Choix*, 39; *Hook. f. Fl. Nov. Zel.* i. 306; *Handb. N.Z. Fl.* 337; *Buch. N.Z. Grasses*, t. 53B. *Eragrostis imbecilla*, *Benth. Fl. Austral.* vii. 643.

Var. *Matthewsii*, *Hack. MSS.*—Taller, 10–20 in. high. Panicle larger, 4–8 in. long. Spikelets rather larger, 4–6-flowered. Flowering glumes closer, usually 5-nerved, but the intermediate nerves on each side often very faint.—*P. Matthewsii*, *Petrie in Trans. N.Z. Inst.* xxxiv. (1902) 392. *P. breviculmis*, *Hook. f. Handb. N.Z. Fl.* 337 (*in part*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Not uncommon in shaded places throughout. Sea-level to 4000 ft.

As a species, *P. imbecilla* is well characterized by the slender flaccid habit, small spikelets with minute outer glumes, and obtuse glabrous flowering glumes, which are usually 3-nerved in the typical form, but generally 5-nerved in var. *Matthewsii*. It is said to occur in Australia.

23. *P. breviglumis*, *Hook. f. Fl. Antarct.* i. 101.—Culms tufted, decumbent at the base, ascending above, slender, smooth and glabrous, leafy, 6–12 in. high. Leaves shorter than the culms, narrow, $\frac{1}{20}$ – $\frac{1}{12}$ in. broad, flat, flaccid, striate; sheaths short, deeply grooved; ligules oblong, obtuse, scarious. Panicle erect, oblong, lax, slender, 2–5 in. long; branches few, in alternate fascicles of 3–5, slender, unequal, capillary, simple or sparingly divided.

Spikelets compressed, pale-green, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, 3–4-flowered. Two outer glumes very unequal, small, several times less than the length of the spikelet; lower minute, ovate, obtuse, 1-nerved; upper three times the length, broadly ovate, concave, 3-nerved, obtuse or truncate or erose at the tip. Flowering glumes ovate-oblong, acute, prominently 3-nerved, glabrous, smooth or minutely scabrid on the keel and nerves. Palea shorter than the glume, linear-oblong, ciliate on the keels. Anthers broadly oblong, minute, about $\frac{1}{60}$ in. long.—*Handb. N.Z. Fl.* 337 (*in part*).

AUCKLAND ISLANDS: *Kirk! Chapman!* CAMPBELL ISLAND: *Sir J. D. Hooker!*

Of this species I have only seen a fragment of one of Hooker's Campbell Island specimens, and two or three collected on the Auckland Islands by Kirk and Chapman. All these differ from *P. imbecilla* in the very unequal and much more minute outer glumes, and in the prominently nerved and acute flowering glumes. How far these characters are constant can only be ascertained from the inspection of a larger series of specimens. The New Zealand examples referred to *P. breviglumis* in the Handbook are probably referable to *P. imbecilla* var. *Matthewsii*.

29. *ATROPIS*, Rupr.

Annual or perennial grasses. Leaves linear, flat or plicate or convolute; ligules hyaline. Spikelets 3- to many-flowered, narrow, laterally compressed or almost cylindric, in open or contracted panicles; rachilla disarticulating above the two outer glumes and between the flowering glumes, glabrous, produced beyond the uppermost flower. Two outer glumes persistent, broad, empty, unequal, rounded on the back, 1–3-nerved. Flowering glumes broad, oblong, obtuse, rounded on the back, 5-nerved, nerves often obscure. Palea nearly as long as the flowering glume, 2-keeled. Lodicules 2, large, ovate, usually distinct. Stamens 3. Ovary glabrous; styles wanting; stigmas plumose. Grain enclosed in the hardened flowering glume and palea, oblong, almost semiterete; hilum small, basal, punctiform.

A small genus of 12 or 14 species, mostly from the temperate regions of the Northern Hemisphere. It differs from *Poa* principally in the flowering glumes being rounded on the back, not keeled.

Panicle contracted, lax; branches distant. Spikelets $\frac{1}{2}$ – $\frac{1}{3}$ in., 5–9-flowered. Empty glumes very small .. 1. *A. stricta*.

Panicle contracted, dense; branches close. Spikelets $\frac{1}{2}$ in., 4-flowered. Empty glumes longer, half the length of the spikelet 2. *A. novæ-zealandiæ*.

A. pumila, T. Kirk in Trans. N.Z. Inst. xiv. (1882) 379, is *Triodia pumila*, Hack.

1. *A. stricta*, Hack. MSS.—Annual. Culms tufted, strict, erect, quite glabrous, leafy, 3–4-noded, the uppermost node below the middle, 6–18 in. high. Leaves sheathing almost the whole of the

culm, narrow, setaceously involute, strict, erect, quite smooth; sheaths pale, lower rather lax; ligules ovate, membranous. Panicle slender, contracted when in flower, 3-6 in. long; branches very unequal, in distant fascicles of 2-5, strict, erect in flower, spreading in fruit, simple or sparingly branched. Spikelets alternate on the branchlets, narrow, almost terete, pale, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, 5-9-flowered. Two outer glumes very unequal, the lower narrow-ovate, acute, 1-nerved, not half the length of the flowering glume above it; upper twice as long as the lower, oblong, sub-acute, 3-nerved. Flowering glumes oblong, obtuse and hyaline at the tips, distinctly 5-nerved, but the nerves disappearing below the tip, quite smooth and glabrous. Palea shorter than the glume, linear-oblong, ciliolate along the keels. Lodicules distinct. Anthers oblong, about $\frac{1}{4}$ in. long.—*Glyceria stricta*, *Hook. f. Fl. Nov. Zel.* i. 304; *Handb. N.Z. Fl.* 336; *Fl. Tasm.* ii. 123, t. 162B; *Benth. Fl. Austral.* vii. 658; *Buch. N.Z. Grasses*, t. 41A.

Var. *suborbicularis*, *Hack. MSS.*—Flowering glume much broader than in the type, in outline almost orbicular. Leaves weaker and thinner.

NORTH AND SOUTH ISLANDS: Not uncommon in brackish-water marshes from the Bay of Islands southwards to the Bluff. Var. *suborbicularis*: Near Oamaru, *Petrie!*

Also in Australia and Tasmania. The northern *A. distans*, Griseb., which is closely allied to *A. stricta*, is naturalised in several localities. It is not nearly so strict, the leaves are flatter, the panicle not so contracted, and the spikelets are much smaller.

2. *A. novæ-zealandiæ*, *Hack. MSS.*—Annual, pale whitish-green. Culms densely tufted, erect, quite glabrous, leafy, 3-4-noded, the uppermost node much above the middle, 4-14 in. high. Leaves sheathing the whole of the culm, strict, erect, complicate, striate; sheaths compressed, usually longer than the blades, grooved; ligules broad, membranous, hyaline, irregularly toothed at the tip. Panicle 2-6 in. long, erect, contracted, dense, pale whitish-green; branches in fascicles of 2-7, very unequal, short, smooth, erect. Spikelets numerous, sessile or shortly pedicelled, about $\frac{1}{4}$ in. long, 4-5-flowered. Two outer glumes slightly unequal, about $\frac{1}{2}$ the length of the whole spikelet; lower narrow, lanceolate, acute, 1-nerved, sometimes with a short lateral nerve on each side; upper broader and more obtuse, 3-nerved. Flowering glumes oblong or oblong-ovate, obtuse and hyaline at the tip, with sometimes an obscure notch on each side, 5-nerved, glabrous or slightly hairy on the back near the base. Palea as long as the glume, linear-oblong, minutely bidentate at the tip, ciliolate on the nerves. Lodicules distinct. Anthers linear-oblong, about $\frac{1}{20}$ in. long.—*Poa Walkeri*, *Kirk in Trans. N.Z. Inst.* xvii. (1885) 224. *Glyceria novæ-zealandiæ*, *Petrie in. Trans. N.Z. Inst.* xxxiii. (1901) 329.

SOUTH ISLAND: Brackish-water marshes on the south coast of Otago, *Kirk* !
Petrie ! STEWART ISLAND: East Coast, local, *Kirk* !

Easily distinguished from the preceding by the stouter habit, denser panicle with shorter branches, smaller pale whitish-green spikelets with fewer florets, much larger empty glumes, and narrower and more pointed flowering glumes.

30. *FESTUCA*, Linn.

Perennial or rarely annual grasses. Leaves flat or complicate or convolute, often setaceous; ligules scarious. Spikelets 2- to many-flowered, arranged in open or contracted often unilateral panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes unequal or subequal, empty, persistent, more or less keeled, 1-3-nerved. Flowering glumes lanceolate, acute or acuminate or awned, rounded on the back or slightly keeled towards the tip, herbaceous, 5-7-nerved; awn from the tip or close to it, straight; callus glabrous or nearly so. Palea 2-keeled, more or less 2-toothed, scabrid or ciliate along the keels. Lodicules 2. Stamens 3. Ovary glabrous or minutely hairy at the tip; styles distinct, very short; stigmas plumose. Grain enclosed within the slightly hardened flowering glume and palea and often adherent to the latter, oblong, concave or grooved in front; hilum long, linear.

A genus of about 90 species, mainly found in the temperate regions of the Northern Hemisphere, not so abundant in the south temperate zone, absent in the tropics except on high mountains. It differs from *Atropis* in the long linear hilum, and from *Poa* in the same character and in the flowering glumes being more or less rounded on the back and often awned.

* Flowering glumes not awned.

Culms $1\frac{1}{2}$ -3 ft., forming dense hard tussocks. Panicle
 2-9 in. Spikelets turgid, $\frac{1}{2}$ - $\frac{3}{4}$ in. long 1. *F. littoralis*.

** Flowering glumes awned; awn much shorter than the glume.

Culms 6-18 in., without creeping stolons, innovation-shoots intravaginal with the sheaths open or closed. Leaves usually setaceous; ligules biauricled. Spikelets
 4-7-flowered 2. *F. ovina*.

Culms 9-18 in., usually stoloniferous; innovation-shoots both intravaginal and extravaginal; sheaths always closed. Stem-leaves often broader; ligules not obviously biauricled. Spikelets 4-8-flowered 3. *F. rubra*.

Culms 6-9 in., densely tufted. Leaves strict, erect, complicate or terete. Panicle spike-like. Spikelets 2-3-flowered; empty glumes $\frac{1}{2}$ the length of the spikelet .. 4. *F. contracta*.

*** Flowering glumes awned; awn as long or longer than the glume.

Culms 6-18 in., densely tufted, stoloniferous. Leaves soft, pliant, terete. Panicle narrow, spiciform. Spikelets
 3-5-flowered 5. *F. Covi*.

1. **F. littoralis**, Labill. *Pl. Nov. Holl.* i. 22, t. 27.—Forming dense hard tussocks of a pale yellow-green colour. Culms branched at the base, erect, rigid, smooth and polished, $1\frac{1}{2}$ –3 ft. high. Leaves longer or shorter than the culms, narrow, so strongly involute that the blade is terete, erect, rigid and pungent-pointed, quite smooth and polished; sheaths pale, grooved; ligules short. Panicle 2–9 in. long, narrow, dense and spike-like; rhachis stout, angled, grooved; branches short, erect, usually few-flowered; pedicels short, pilose. Spikelets large, broad, flattened or somewhat turgid, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, 4–7-flowered, pale yellowish-green. Two outer glumes subequal, more than half as long as the spikelet, keeled, lanceolate, acuminate, 3–5-nerved, glabrous. Flowering glumes oblong-lanceolate, rounded on the back at the base, keeled above, 5–7-nerved, acute or very minutely notched at the tip, the central nerve stout and slightly protruding in the notch, equally minutely hairy all over, base of glume, callus, and rhachilla more or less densely clothed with short hairs. Palea lanceolate, ciliolate along the keels. Grain narrow-oblong, almost terete; hilum linear, very short.—*A. Rich. Fl. Nouv. Zel.* 123; *Hook. f. Fl. Tasm.* ii. 128; *Handb. N.Z. Fl.* 341; *Buch. N.Z. Grasses*, t. 54. *Schedonorus littoralis*, Beauv. *Agrost.* 99; *A. Cunn. Precur.* n. 259; *Raoul, Choix*, 39; *Hook. f. Fl. Nov. Zel.* i. 310.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in sandy and rocky places near the shore. Also common on the coasts of temperate Australia.

• 2. **F. ovina**, Linn. *Sp. Plant.* 73.—Culms 6–18 in. high, densely tufted, slender, erect, 2–3-noded; innovation-shoots always intravaginal, not stoloniferous. Leaves 2–6 in. long, all similar, narrow, setaceous or capillary, obtuse or acute, 3–7-nerved, green or glaucous, smooth or minutely scabrid; sheaths of the innovation-shoots either open nearly to the base or more or less closed, 3–9-nerved; ligules short, truncate, 2-lobed and articulate. Panicle 1–5 in. long, narrow, dense or rather lax, erect or nodding, often secund; rhachis smooth or scabrid; branches solitary or the lower binate, simple or divided, usually scabrid. Spikelets oblong or oblong-lanceolate, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, laxly 4–7-flowered. Two outer glumes unequal, lanceolate, acute, lower 1-nerved, upper larger, 3-nerved. Flowering glumes oblong-lanceolate, rounded on the back, smooth or minutely scaberulous, sometimes pruinose, faintly 5-nerved, shortly awned. Palea as long as the glume, ciliolate on the keels.—*F. duriuscula*, *Hook. f. Fl. Nov. Zel.* i. 309; *Handb. N.Z. Fl.* 341 (in part, not of Linn.).

Var. **novæ-zealandiæ**, Hack. in *Trans. N.Z. Inst.* xxxv. (1903) 384.—Culms densely tufted, scabrid, 3-noded, 12–20 in. high. Leaves almost as long as the culms, strict, erect, very narrow, cylindric, setaceous, sharply acute or almost pungent, rough with scabrid points; sheaths open, smooth; ligules evi-

dently auricled, glabrous. Panicle oblong, contracted but rather lax; lower branches binate, 3-6-spiculate. Spikelets elliptic, $\frac{1}{2}$ in. long, laxly 5-7-flowered. Two outer glumes linear-lanceolate. Flowering glumes lanceolate, minutely scaberulous, short-awned at the tip.

Var. *Matthewsii*, Hack. l.c. 385.—Culms erect, quite smooth and glabrous, 12-20 in. high. Leaves almost equalling the culms, narrow, complicate, somewhat acute at the tip, quite glabrous, ribbed when dry, furnished at the base with a brown pulvinate callus; sheaths rather lax, open, quite smooth; ligules 2-lobed, lobes acute, ciliolate. Panicle 3-6 in. long, ovate-oblong, spreading, lax, nodding; rhachis and branches scabrid; the latter binate, naked at the base, 1-3-spiculate at the tip. Spikelets large, ovate-lanceolate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, 5-7-flowered.

NORTH AND SOUTH ISLANDS: Forms resembling common European states occur in several localities, but may be introduced. *Var. novæ-zealandiæ:* Ruahine Mountains, *A. Hamilton!* Probably not uncommon in the South Island. Nelson—Clarence Valley, *T. F. C.* Canterbury—Mount Torlesse, *T. F. C.* Otago—Maniototo Plain, Cambrians, Dunstan Mountains, *Petrie!* *Var. Matthewsii:* Otago—Mount Bonpland, *H. J. Matthews!* *Petrie!* Sea-level to 4500 ft. *Sheep's Fescue.*

A common grass in the temperate portions of the Northern Hemisphere. The two varieties described above have a very different appearance from the majority of the European forms, particularly *var. Matthewsii*, which is remarkable for its large spikelets and curious swollen callus at the base of the leaf-blades.

3. *F. rubra*, Linn. Sp. Plant. 74.—Culms 9-18 in. high, laxly or densely tufted, erect or geniculate at the base, smooth, striate, 2-noded; innovation-shoots both intravaginal and extravaginal, the extravaginal ones ascending or stoloniferous and creeping. Leaves 3-6 in. long, narrow, those of the innovation-shoots and sometimes of the culms setaceous, but frequently the culm-leaves are broader and flat or involute when dry, 3-7-nerved, smooth, obtuse or subacute at the tip; sheaths of the innovation-shoots tight, smooth, closed almost to the mouth; ligules very short, glabrous, not auricled or obscurely so. Panicle very variable, 1-5 in. long, contracted, usually rather dense, erect or nodding, often secund; rhachis angled, scabrid; branches solitary or the lowest binate, divided almost from the base, scaberulous. Spikelets elliptic-lanceolate to oblong, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, laxly 4-8-flowered. Two outer glumes unequal; lower lanceolate, acuminate, 1-nerved; upper larger, ovate-lanceolate, 3-nerved. Flowering glumes oblong-lanceolate, involute and rounded on the back, faintly 5-nerved, shortly awned; awn slender, scaberulous. Palea as long as the glume, linear-oblong, ciliolate on the keels.—*F. duriuscula*, *Hook. f. Fl. Nov. Zel.* i. 309; *Handb. N.Z. Fl.* 341 (*for the most part, but not of Linn.*).

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant from the East Cape and the Upper Waikato southwards. Sea-level to 4500 ft.

According to Professor Hackel, this constitutes the greater part of the *F. duriuscula* of the "Flora Novæ-Zelandiæ" and the Handbook, the true *F. duriuscula* probably not existing in an indigenous state in New Zealand. It

is very closely allied to *F. ovina*, differing mainly in the innovation-shoots being frequently stoloniferous, and usually both extravaginal and intravaginal, and in their sheaths being closed almost to the mouths; also in the ligules not being auricled, and in the stem-leaves being usually broader and flatter than those on the innovation-shoots. It has considerable value as a sheep-grass, and is often sown on sheep-runs. Outside New Zealand it has a wide range in Europe and northern Asia.

4. **F. contracta**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 353.—Culms densely tufted, smooth, strict, erect, leafy, 6–9 in. high. Leaves longer or shorter than the culms, narrow, strict, erect, complicate or almost terete, pungent at the tip, smooth or faintly striate on the back, the midrib and nerves prominent on the inner face; sheaths rather lax, thin, pale, grooved; ligules very short, truncate. Panicle 2–3 in. long, strict, narrow, erect, spike-like, simple or with a few short branches in the lower half; rhachis angled, scaberulous; branches or pedicels short, stout, erect. Spikelets pale, about $\frac{1}{2}$ in. long including the awns, 2–3-flowered. Two outer glumes unequal, from $\frac{3}{4}$ to $\frac{4}{5}$ the length of the entire spikelet, narrow-lanceolate, smooth, membranous, acuminate but not awned; lower 1- or faintly 3-nerved, upper distinctly 3-nerved. Flowering glumes lanceolate, rounded on the back, rather thin, 5-nerved, narrowed into a short stiff awn, surfaces minutely scaberulous, callus glabrous. Palea shorter than the glume, faintly ciliolate along the keels. Grain oblong-obovoid, grooved; hilum linear, about $\frac{1}{2}$ its length.

MACQUARIE ISLAND: *Professor Scott! A. Hamilton!*

I have only seen two very indifferens specimens of this plant, and some allowance must consequently be made for the description.

5. **F. Coxii**, *Hack. MSS.*—Rhizome stout, creeping. Culms densely tufted, branched at the base, erect or slightly geniculate, slender, smooth, leafy, 6–18 in. high. Leaves numerous, longer than the culms, slender, soft, pliant, the margins so much involute that the leaf is terete, smooth on the back, midrib prominent on the inner face; sheaths rather lax, thin, smooth, striate, open to the base; ligules very short, truncate, ciliolate at the tip. Panicle 2–3 in. long, narrow, rather dense, often reduced to a simple raceme or spike, or with 2–3-spiculate branches in the lower part; rhachis stout, angled, scabrid; branches or pedicels very short, stout, scabrid, the upper spikelets nearly sessile. Spikelets about $\frac{3}{4}$ in. long with the awns, laxly 3–5-flowered. Two outer glumes unequal, from $\frac{1}{2}$ to $\frac{3}{4}$ the length of the whole spikelet, narrowed into long acuminate scabrid points; lower linear, 1-nerved; upper longer, narrow-lanceolate, 3-nerved. Flowering glumes oblong-lanceolate, firm, rounded on the back, concave, faintly 5-nerved, gradually narrowed into a terete scabrid awn as long or longer than the glume, surface densely minutely scabrid, callus glabrous. Palea

as long as the glume, deeply 2-fid, serrulate along the keels. Grain linear-oblong, deeply grooved; hilum $\frac{4}{5}$ the length of the grain.—*Agropyrum* Coxii, *Petrie in Trans. N.Z. Inst.* xxxiv. (1902) 395.

CHATHAM ISLANDS: Common on rocks and sands near the shore, *Cox and Cockayne*!

A distinct species, well marked by the peculiar habit, narrow spike-like panicles, short stout pedicels, narrow awned empty glumes, and by the long-awned flowering glumes.

31. **BROMUS**, Linn.

Annual or perennial grasses, of very various habit. Leaves flat, often flaccid; ligules membranous. Spikelets laterally compressed, 4- to many-flowered, arranged in a lax or contracted panicle, rarely reduced to a raceme; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes unequal, empty, persistent, 1-7-nerved. Flowering glumes lanceolate to oblong, rounded on the back or keeled, 5-9-nerved, usually 2-toothed at the apex, awned from between the teeth or rarely from below them. Palea 2-toothed, ciliate or scabrid on the keels. Lodicules 2, oblong or lanceolate, entire or lobed. Stamens usually 3. Ovary oblong or obovoid, furnished with a 2-3-lobed hairy cushion-like appendage at the summit; styles short, placed laterally on the appendage; stigmas plumose. Grain linear or oblong, furrowed, adherent to the palea; hilum long, narrow-linear.

Species 40 or 50, most abundant in the north temperate zone and in South America, rare on the high mountains of the tropics. The single indigenous species is a common Australian plant.

1. **B. arenarius**, *Labill. Pl. Nov. Holl.* i. 23, t. 28.—Annual, everywhere villous with soft spreading hairs. Culms slender, erect or ascending, sometimes geniculate near the base, leafy. Leaves 2-5 in. long, linear, flat, flaccid, withering early; sheaths close, thin, strongly striate; ligules hyaline, fimbriate at the tip. Panicle 2-6 in. long, flaccid, nodding; rhachis slender, pilose; branches in fascicles of 3-7, slender, capillary, spreading and flexuous, the longest $1\frac{1}{2}$ in. long, bearing 1-3 spikelets on very slender capillary pedicels. Spikelets about $\frac{3}{4}$ in. long without the awns, $1\frac{1}{4}$ - $1\frac{1}{2}$ in. long with them, 4-8-flowered. Two outer glumes unequal, not $\frac{1}{2}$ the length of the spikelet, villous with long hairs, acuminate, margins hyaline; the lower narrow-lanceolate, 3-nerved, but the lateral nerves often short and faint; upper oblong-lanceolate, 5-7-nerved. Flowering glumes oblong-lanceolate, thin and membranous, hyaline on the margins, strongly 7-nerved, villous, deeply 2-fid at the tip; awn as long or longer than the glume, straight, scabrid, from the back just below the notch. Palea narrow, shorter than the glume, ciliate on the keels.—*Hook. f. Fl. Nov. Zel.*

i. 310; *Handb. N.Z. Fl.* 341; *Benth. Fl. Austral.* vii. 661; *Buch. N.Z. Grasses*, t. 56A. *B. australis*, *R. Br. Prodr.* 178; *A. Cunn. Precur.* n. 258; *Raoul, Choix*, 39.

NORTH ISLAND: Rocky and sandy places near the sea, abundant from the North Cape to the East Cape and Taranaki, local farther south, rare inland, but occurring at Lake Rotorua and elsewhere. SOUTH ISLAND: Cape Farewell, *Kirk*! Also not uncommon in Australia.

Several species of *Bromus* from the Northern Hemisphere are now firmly established as naturalised plants, the most abundant being *B. mollis*, a rather small species with a compact ovoid panicle and turgid spikelets; and *B. sterilis*, with a lax drooping panicle and large long-awned spikelets 2 in. long with the awns.

32. AGROPYRUM, Gaertn.

Annual or perennial grasses. Leaves flat or convolute; ligules scarious. Spikelets more or less laterally compressed, 3- to many-flowered, solitary and sessile, distichously placed in the alternate hollows of the continuous or jointed rhachis of a simple spike, one face of the spikelet next the rhachis; rhachilla disarticulating above the two outer glumes and usually between the flowering glumes. Two outer glumes subequal or unequal, empty, persistent, lanceolate or linear. Flowering glumes more or less rigid, and coriaceous, rounded on the back or keeled above, 5-7-nerved, awned or awnless. Palea rather shorter than the glume, sharply 2-keeled, ciliate on the keels. Lodicules 2, oblique or unequally lobed, entire or ciliate. Stamens 3. Ovary villous at the top; styles very short; stigmas plumose. Grain narrow, compressed at the back, often adherent to the palea; hilum as long as the grain.

Species about 35, found in almost all temperate counties, but most abundant in Europe and north Asia. Of the 4 species found in New Zealand, 1 extends to Australia, the remaining 3 are endemic.

* Awn short, never more than $\frac{1}{2}$ the length of the flowering glume.

Spikelets 1 in., 6-12-flowered.	Awn very short, sometimes wanting	1. <i>A. multiflorum</i> .
Spikelets $\frac{1}{2}$ in., 2-4-flowered.	Awn from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the flowering glume	2. <i>A. Enysii</i> .

** Awn very long, from 3 to 5 times the length of the flowering glume.

Spikelets $1\frac{1}{2}$ -3 in. long with the awns; awn rather slender	3. <i>A. scabrum</i> .
Spikelets 4 in. long with the awns; awn stout, rigid, channelled	4. <i>A. Youngii</i> .

1. **A. multiflorum**, *T. Kirk in Trans. N.Z. Inst.* xxix. (1897) 530.—Perennial. Culms densely tufted, branched, decumbent or almost prostrate at the base, erect above, quite smooth and glabrous, leafy, 1-2 ft. high. Leaves 3-8 in. long, about $\frac{1}{8}$ in. broad, flat or slightly convolute when dry, tapering from the base upwards, somewhat rigid and coriaceous, prominently striate,

rough above, often glaucous; sheaths tight, pale, grooved; ligules short, truncate, membranous. Spike straight, erect, 3-6 in. long, of 6-12 spikelets; rhachis pubescent on the angles. Spikelets about 1 in. long, close or somewhat distant, erect, appressed to the rhachis, 6-12-flowered. Two outer glumes small, unequal, lanceolate, acuminate, 3-7-nerved. Flowering glumes oblong-lanceolate when spread out, convolute, smooth and rounded on the back below, scabridly keeled above, 7-9-nerved, coriaceous, acute or mucronate or produced into a short awn of varying length. Palea sharply keeled and folded, ciliolate on the keels.—*Triticum multiflorum*, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i. 311; *Handb. N.Z. Fl.* 342; *Buch. N.Z. Grasses*, t. 56B. *T. repens*, *A. Rich. Fl. Nouv. Zel.* 138; *A. Cunn. Precur.* n. 261; *Raoul, Choix*, 39 (not of *Linn.*).

Var. *longisetum*, *Hack. MSS.*—Awn longer, sometimes half the length of the flowering glume.

NORTH ISLAND: Not uncommon in lowland districts throughout, especially near the coast. SOUTH ISLAND: Queen Charlotte Sound, *Banks and Solander*; near Nelson, *T. F. C.*; Canterbury, *Armstrong*.

A variable plant in the size of the spikelets, number of flowering glumes, and the extent to which the awn is developed.

2. *A. Enysii*, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 352.—Culms laxly tufted, very slender, weak, decumbent at the base, erect above, sparingly leafy, 1-2½ ft. high. Leaves much shorter than the culms, $\frac{1}{15}$ – $\frac{1}{6}$ in. broad, flat, flaccid, striate, minutely rough to the touch, glabrous or sparingly villous; sheaths long, tight, softly villous or the upper ones almost glabrous; ligules short, truncate, erose. Spike 2-5 in. long, slender, erect or inclined, often interrupted below, of 9-18 spikelets; rhachis compressed, scabrid on the angles. Spikelets bluish-green, $\frac{1}{2}$ in. long, 2-4-flowered. Two outer glumes about $\frac{1}{2}$ the length of the spikelet, subequal, linear-lanceolate, 3-5-nerved, gradually narrowed into a scabrid acuminate point or awn $\frac{1}{3}$ to $\frac{1}{2}$ the length of the glume. Flowering glumes lanceolate, rounded on the back, smooth and coriaceous, 5-nerved, sometimes minutely 2-toothed at the tip, narrowed into a short scabrid awn about $\frac{1}{3}$ the length of the glume. Palea shorter than the glume, linear-oblong, coriaceous, ciliolate on the keels.—*Asprella aristata*, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 272.

SOUTH ISLAND: Canterbury—Slopes of Mount Torlesse and Broken River, *Enys! Petrie! T. F. C.*; Bealey River, *Kirk!* Poulter River, *Cockayne!* Southern Alps, *N. T. Carrington!* 2500-4500 ft.

A very distinct species, at once recognised by the weak habit, flat membranous leaves, narrow spike, and few-flowered spikelets. Very similar in habit to *Asperella gracilis*, and easily mistaken for it on a cursory inspection, but the structure of the spikelet is that of *Agropyrum*.

3. **A. scabrum**, *Beauv. Agrost.* 102.—Annual or perennial, very variable. Culms laxly tufted, slender, decumbent at the base, erect or ascending above, quite smooth, leafy, 6–24 in. high. Leaves 2–9 in. long, $\frac{1}{10}$ – $\frac{1}{10}$ in. broad, flat or convolute, usually scabrid on both surfaces, often glaucous; sheaths smooth, grooved, the upper long; ligules short, truncate. Spike 3–9 in. long, of 2–10 rather distant erect spikelets; rhachis flattened, scabrid on the angles. Spikelets $\frac{3}{4}$ –1 in. long without the awns, $1\frac{1}{2}$ –3 in. with them, 6–12-flowered. Two outer glumes small, not reaching more than $\frac{1}{3}$ up the flowering glumes immediately above them, subequal, narrow-lanceolate, tapering into short acuminate points, rigid, 3–5-nerved. Flowering glumes lanceolate, coriaceous, smooth and rounded on the back at the base, obscurely keeled and scabrid above, 3–5-nerved, narrowed into a long and slender straight or flexuous scabrid awn from 3 to 5 times as long as the glume itself. Palea almost as long as the glume, linear-oblong, ciliolate on the keels.—*Benth. Fl. Austral.* vii. 665. *Triticum scabrum*, *R. Br. Prodr.* 178; *A. Rich. Fl. Nouv. Zel.* 137; *A. Cunn. Precur.* n. 260; *Raoul, Choix*, 39; *Hook. f. Fl. Nov. Zel.* i. 311; *Handb. N.Z. Fl.* 342; *Buch. N.Z. Grasses*, t. 57. *Festuca scabra*, *Lab. Pl. Nov. Holl.* i. 22, t. 26.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant throughout. Sea-level to 4500 ft.

Also plentiful in Australia, from Queensland to Tasmania and West Australia. In small specimens the spike is sometimes reduced to a single terminal spikelet. Subalpine specimens usually have larger and fewer spikelets with longer awns than those from lowland districts, but the size of the spikelet and length of the awns varies excessively.

4. **A. Youngii**, *Cheesem.*—"Habit of *T. scabrum*. Leaves quite glabrous below, slightly scabrid on the upper surface. Spike 2–3 in. long, of 3–4 very large spikelets 4 in. long, including the awns. Empty glumes $\frac{1}{2}$ in. long, acuminate, margins membranous, flowering ones nearly $\frac{3}{4}$ in. long without the awn, which is $1\frac{1}{2}$ –2 in. long, very stout, rigid, scabrid, convex at the back, concave in front with scabrid edges, margins and sides of glume scabrid and almost aculeate."—*Triticum Youngii*, *Hook. f. Handb. N.Z. Fl.* 343.

SOUTH ISLAND: Canterbury—"Grassy flats, sources of the Waitaki altitude 3000 ft., *Haast*."

"A remarkable plant, with few spikelets, almost twice as large as those of *T. scabrum*, and very long rigid awns. My specimens are imperfect, and some allowance must here be made for the description." This does not seem to have been observed since its original discovery by Haast, and in the absence of further information I have reproduced Hooker's description. Apparently it only differs from *A. scabrum* in the larger size of the spikelets and the longer and stouter awns, and seeing how variable these characters are in *A. scabrum* I should not be surprised if it proved to be a form of that plant.

33. **ASPERELLA**, Humb.

Perennial grasses. Leaves narrow, flat. Spikelets 1- to several-flowered, 2-3 together or solitary in the alternate hollows of the rhachis of a simple slender spike, one face of the spikelet next the rhachis; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes either wanting, or present in the lower spikelets as minute subulate bristles. Flowering glumes narrow-lanceolate, rigid, convolute, rounded on the back, 5-nerved above, produced into a short awn. Palea rather shorter than the glume, 2-keeled. Lodicules 2, obovate or dimidiate-obovate, hairy. Stamens 3. Styles short, distinct; stigmas plumose. Grain narrow-oblong, villous at the tip, grooved down the front, adherent to the palea.

A small genus of 7 species—2 in New Zealand, 2 in North America, and 1 each in the Himalayas, Japan, and Siberia.

- Outer glumes often wanting. Flowering glumes more or less scabrid, distinctly 5 nerved, narrowed into an awn of varying length 1. *A. gracilis*.
 Outer glumes always present. Flowering glumes smooth, faintly 3-5-nerved, truncately 3-toothed at the apex, the middle tooth produced into a short mucro 2. *A. lævis*.

1. ***A. gracilis***, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 352. — Perennial. Culms much branched and decumbent at the base, erect above, slender, often rather wiry, quite smooth and glabrous, leafy throughout, 1-3 ft. high. Leaves 3-9 in. long, $\frac{1}{2}$ – $\frac{1}{8}$ in. broad, flat, striate, minutely scabrid on the margins and upper surface; sheaths smooth, thin, striate; ligules often obscure. Spike elongated, 3-8 in. long, very slender, of 20-40 sessile spikelets placed singly in the alternate hollows of the rhachis; rhachis compressed, flat, flexuous, ciliate on the edges. Spikelets pale-green, $\frac{1}{3}$ – $\frac{2}{3}$ in. long with the awns, 1-3-flowered. Two outer glumes altogether absent or reduced to minute bristles. Flowering glumes lax, lanceolate, 5-nerved, rounded on the back below, midrib prominent above, usually more or less scabrid but sometimes nearly smooth, gradually narrowed into a scabrid awn of variable length, callus prominent. Palea almost as long as the glume, keels ciliate.—*Gymnostichum gracile*, *Hook. f. Fl. Nov. Zel.* i. 312, t. 70; *Handb. N.Z. Fl.* 343; *Buch. N.Z. Grasses*, t. 58.

NORTH AND SOUTH ISLANDS: Auckland—Te Pahi, Kaipara, *Kirk*! Thames, *Adams*! *T. F. C.*; Te Aroha, *Adams*! Rotorua, *T. F. C.*; East Cape district, *Adams* and *Petrie*. Hawke's Bay—Tarawera, Dannevirke, *Colenso*! Turangarere, *Petrie*. Wellington—*Buchanan*. Nelson—Lower Motueka, *Graham River*, *T. F. C.* Canterbury—Akaroa, *Raoul*, *Armstrong*; Mount Cook district, *T. F. C.* Otago—Not uncommon in lowland districts, *Buchanan*! *Petrie*! Sea-level to 3000 ft.

2. ***A. lævis***, *Petrie in Trans. N.Z. Inst.* xxvii. (1895) 406. — Culms branched from the base, slender, erect or diffuse, sparingly

leafy, 10-30 in. high. Leaves 3-9 in. long, $\frac{1}{15}$ - $\frac{1}{8}$ in. broad, flat or involute, striate, smooth or nearly so; sheaths smooth or puberulous; ligules short. Spike 3-6 in. long, slender, of 15-30 spikelets; rhachis flat, flexuous, scabrid on the edges. Spikelets pale-green, about $\frac{1}{2}$ in. long, 1-2-flowered. Two outer glumes always present, reduced to linear-subulate bristles about three-quarters the length of the lower flowering glume, subequal, erect, channelled, scabrid. Flowering glumes lanceolate, faintly 3-5-nerved, rounded on the back, quite smooth, unequally 3-toothed at the apex, the middle tooth produced into a short scabrid mucro. Palea rather shorter than the glume, keels smooth or minutely ciliolate.

SOUTH ISLAND: Nelson—Clarence Valley, *Kirk*! Otago—Matukituki Valley, Catlin's River, *Petrie*! Waikawa, *H. J. Matthews*! Sea-level to 2000 ft.

Very close to *A. gracilis*, from which it differs in the two outer glumes being always present, and in the flowering glumes being smooth, obscurely nerved, and truncately 3-toothed at the apex, the middle tooth being produced into a short stout mucro. Further observation is required to prove the constancy of these characters.

ORDER XCIII. FILICES.

Perennial or very rarely annual plants, usually herbaceous but sometimes arboreous (tree-ferns). Stems generally reduced to a rhizome, which may be short and tufted, or long and creeping or climbing; or, in the case of tree-ferns, produced into an erect caudex or trunk. Leaves (*fronds*) either crowded at the end of the rhizome or distantly placed along it, continuous with the rhizome or jointed to it, sometimes simple and entire, but usually more or less deeply pinnately lobed or divided and frequently repeatedly so, more rarely dichotomously branched; always circinate in veneration with the exception of the *Ophioglossaceæ*. Spore-cases or *sporangia* usually arranged in groups (*sori*) on the under-surface or margins of the fertile fronds, which are either similar to the sterile fronds, or narrower and more contracted, the divisions sometimes becoming linear and spike-like. Sori very various in size and shape and position, naked or covered when young by the recurved margin of the frond or by a special involucre (*indusium*). Sporangia many or rarely few in a sorus, often mixed with jointed hairs or scales, stalked or sessile, usually furnished with a complete or incomplete ring or *annulus*, dehiscing by a transverse or vertical slit, free or rarely coherent into a compound sporangium (*syngangium*). Spores numerous, bilateral or tetrahedral.

Ferns constitute one of the largest and most generally distributed of the families of plants, and are found in all quarters of the world, although most abundant in moist climates. It is difficult to estimate the number of species, on account of the divergent views of authors, but they cannot be less than 3500. In the subjoined account of the New Zealand species I have adopted the

limitation of the genera proposed in Hooker and Baker's "Synopsis Filicum," that being the arrangement followed in the Handbook, Bentham's "Flora Australiensis," and other colonial floras, and the one acquiesced in by most English systematists. But European pteridologists as a rule accept a much larger number of genera, with a somewhat different sequence. And it must be admitted that *Polypodium*, *Nephrodium*, *Asplenium*, and other genera, as defined in the Synopsis, are for the most part artificial assemblages of species, possessing very diverse characters and relationships. But though it is comparatively easy to separate a group here and there as being undoubtedly worthy of generic rank, it is admittedly a matter of great difficulty to prepare good and natural generic subdivisions for the whole order, and although many attempts have been made not one of them has received a wide acceptance. The most recent classification is that given in Engler and Prantl's "Die Natürlichen Pflanzenfamilien," where the class Filicales is divided into 12 families and 140 genera, against the 75 genera adopted in the "Synopsis Filicum." The 31 genera of New Zealand ferns are spread out into 42 in the Pflanzenfamilien.

The development of ferns can only be briefly alluded to here. In germination the spore produces a small flattened or rarely filamentous prothallium, usually containing abundant chlorophyll, but without vascular tissue. It becomes quite free from the spore, but is of comparatively short duration. On the under-surface of the prothallium the reproductive organs are formed. The male organs are called antheridia, and consist of minute subglobose bodies each containing numerous motile cells known as spermatozooids, resembling spirally coiled filaments, pointed at one end and bearing numerous cilia. The female organs, or archegonia, are flask-shaped bodies partly sunk in the tissue of the prothallium, each containing a single free cell called the oosphere. Fertilisation is effected by the entrance of spermatozooids into the cavity of the archegonium, and by the fusion of one of them with the oosphere. The oosphere then gradually develops into a young plant.

Since the publication of the Handbook several pamphlets or books dealing with the ferns of the colony have appeared. The most important of these are Mr. G. M. Thomson's "Ferns and Fern Allies of New Zealand" and Mr. H. C. Field's "Ferns of New Zealand." Both of these contain much interesting and valuable information, and should be consulted by all students of the order.

Suborder I. HYMENOPHYLLACEÆ. Sori always marginal, enclosed within a cup-shaped or urceolate entire or 2-valved indusium. Sporangia sessile or shortly stalked, arranged on a short or long columnar receptacle, girt by a complete horizontal or oblique ring. Fronds membranous and translucent (except in Loxsoma).

Fronds membranous and translucent. Indusium deeply 2-valved

1. HYMENOPHYLLUM.

Fronds membranous and translucent. Indusium urceolate or trumpet-shaped, entire or shortly 2-lobed

2. TRICHOMANES.

Fronds coriaceous, opaque. Indusium urceolate, entire

3. LOXSOMA.

Suborder II. CYATHEACEÆ. Sori dorsal or marginal, naked or furnished with an indusium. Sporangia sessile or shortly stalked, arranged on a cushion-like receptacle, girt by a complete vertical or somewhat oblique ring. Stem often arboreous.

Indusium globose, covering the young sorus, but soon bursting at the summit and persistent as a shallow cup surrounding the sorus at the base

4. CYATHEA.

Indusium never covering the sorus, small, half cup-shaped or semicircular, one-sided, not forming a complete ring round the base of the sorus

5. HEMITELIA.

- Indusium altogether wanting 6. ALSOPHILA.
 Indusium 2-valved, the upper valve continuous with the
 margin of the frond 7. DICKSONIA.

Suborder III. POLYPODIACEÆ. Sori dorsal or marginal, naked or furnished with an indusium. Sporangia with a short or long stalk, girt by an incomplete vertical ring, bursting transversely. Habit various.

* Indusium present, at least when the sorus is young.

† Sori dorsal or marginal. Indusium opening outwards, or towards the margin of the frond.

- Sori globose or oblong, submarginal. Indusium often
 cup-shaped, attached by a broad base and sometimes by
 the sides as well 8. DAVALLIA.
 Sori subglobose, dorsal, remote from the margin. In-
 dusium ovate-deltoid, membranous, attached by a broad
 base 9. CYSTOPTERIS.
 Sori linear, marginal. Indusium linear, membranous,
 opening outwards 10. LINDSAYA.

†† Sori variable in shape, linear to globose, marginal. Indusium composed of the more or less modified edge of the frond, which is reflexed over the sorus, opening inwards.

- Sori reniform or globose or oblong, distinct in the New
 Zealand species. Indusium an altered and reflexed
 lobe or tooth of the frond, bearing the sorus on its
 under-surface 11. ADIANTUM.
 Sori subglobose, distinct, in the notches of the ultimate
 divisions of the frond. Indusium a slightly modified
 and reflexed portion of the margin of the frond .. 12. HYPOLEPIS.
 Sori subglobose or oblong, often confluent into linear
 masses. Indusium composed of the modified and re-
 flexed margins of the frond 13. CHEILANTHES.
 Sori confluent, forming a linear band extending along the
 greater part of the edge of the pinnæ, placed on the
 tips of the transverse veins 14. PELLÆA.
 Sori linear, extending along the greater part of the edge of
 the pinnæ or segments, placed on an intramarginal
 longitudinal vein 15. PTERIS.
 Sori linear, on the contracted pinnæ of fertile fronds
 differing much from the sterile ones, covering the whole
 under-surface 16. LOMARIA.

††† Sori linear or oblong, dorsal (or submarginal when the frond is much divided). Indusium the same shape as the sorus, laterally attached to a vein, opening inwards (or towards the costa).

- Sori oblong, on short cross veinlets connecting the primary
 veins, parallel to the costa 17. DOODIA.
 Sori oblong or linear, on the primary veins, oblique to the
 costa 18. ASPLENIUM.

†††† Sori globose, dorsal. Indusium orbicular or reniform, peltate or affixed by the sinus, opening all round the margin.

- Indusium orbicular and peltate 19. ASPIDIUM.

- Indusium reniform and attached by the sinus. Fronds usually 2-4-pinnate; pinnæ not articulated to the rhachis 20. NEPHRODIIUM.
- Indusium reniform and attached by the sinus. Fronds pinnate; pinnæ articulated to the rhachis 21. NEPHROLEPIS.
- ** Indusium altogether absent.**
- Sori globose or broadly oblong, dorsal, distinct 22. POLYPODIUM.
- Sori oblong or rounded, at first distinct but ultimately confluent, marginal, often partly concealed by the reflexed margin of the frond and then barely distinguishable from *Cheilanthes* 23. NOTOCHLÆNA.
- Sori oblong or linear, simple or forked, often confluent, dorsal 24. GYMNOGRAMME.
- Suborder IV. GLEICHENIACEÆ. Sori dorsal, naked, of few (2-6) sporangia; receptacle not elevated. Sporangia sessile or nearly so, splitting vertically, surrounded by a complete transverse ring.*
- Fronds dichotomously forked; ultimate branches pinnately divided 25. GLEICHENIA.
- Suborder V. SCHIZÆACEÆ. Sporangia crowded, not collected into distinct sori, sessile or nearly so, with a complete transverse ring just below the apex, splitting vertically. Fertile portions of the frond much modified.*
- Fronds simple or forked or flabellately divided, without an expanded lamina. Sporangia in 2-4 rows on the under-surface of short linear fertile pinnæ terminating the fronds 26. SCHIZÆA.
- Fronds very long, climbing; primary pinnæ dichotomously or pinnately divided. Sporangia in 2 rows on the under-surface of contracted fertile pinnules 27. LYGODIUM.
- Suborder VI. OSMUNDACEÆ. Sori irregular, distinct or confluent, dorsal; indusium wanting. Sporangia sessile or nearly so, splitting vertically; ring rudimentary, placed just below the apex.*
- Fronds opaque or translucent, 2-3-pinnate 28. TODEA.
- Suborder VII. MARATTIACEÆ. Sori distinct, dorsal. Sporangia sessile, without any ring, coriaceous, splitting vertically or opening by a pore at the apex, usually cohering in concrete masses called synangia.*
- Rhizome large, tuberous. Fronds large, 2-3-pinnate 29. MARATTIA.
- Suborder VIII. OPHIOGLOSSACEÆ. Sporangia globose, coriaceous, sessile, without any ring, dehiscing by a transverse or vertical slit, crowded on a linear spike or on the branches of a panicle. Fronds not circinate in veneration.*
- Sterile frond simple and entire. Sporangia on a linear spike 30. OPHIOGLOSSUM.
- Sterile frond pinnate or 2-4-pinnate. Sporangia on the linear branches of a panicle 31. BOTRYCHIUM.

1. HYMENOPHYLLUM, Linn.

Usually small and sometimes minute ferns. Rhizome slender, creeping, often much branched and matted. Fronds simple or more generally compound, delicately membranous, often pellucid, usually of a single layer of cells; segments entire or toothed at the margin,

with a stout central costa. Sori marginal, terminal or lateral, more or less immersed in the frond or quite free, always terminating a vein or costa. Indusium cup-shaped, more or less deeply 2-lipped or 2-valved, sometimes to the base, of almost the same texture as the frond, margins of the lips entire or toothed or fringed. Receptacle linear or oblong, not exerted beyond the indusium. Sporangia sessile or nearly so, depressed, surrounded by a broad complete horizontal ring, bursting transversely.

One of the most beautiful of the genera of ferns, almost wholly confined to shaded localities, and remarkable for the filmy texture of the frond, a peculiarity which it shares with *Trichomanes*. Species about 90, widely distributed in tropical climates and in the south temperate zone, especially abundant in New Zealand, rare in the north temperate zone. Of the 20 species found in New Zealand, 7 or perhaps 8 are endemic, the remainder are for the most part widely dispersed.

A. Euhymenophyllum. Margin of the frond entire.

* Fronds glabrous; or, if hairs are present, they are confined to the stipes, rhachis, and costæ.

† Rhachis winged throughout; wing often decurrent down the stipes, sometimes to the base.

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|--|-----------------------------------|
| Fronds 1-4 in., pendulous, flaccid, 2-pinnatifid. Stipes capillary; rhachis often wingless below. Sori large, terminal, immersed; indusium orbicular | 1. <i>H. rarum</i> . |
| Fronds 2-9 in., olive-green, 3-pinnatifid, sometimes with scattered hairs on the rhachis and stipes. Sori terminating short lateral segments, free; indusium broadly ovate | 2. <i>H. polyanthos</i> . |
| Fronds 2-6 in., brownish-green, 3-4-pinnatifid; segments narrow, crowded. Stipes, rhachis, and costæ usually villous. Sori numerous, terminal, free; indusium broadly ovate | 3. <i>H. villosum</i> . |
| Fronds 3-9 in., triangular. Rhachis with a broad much-cripsed wing decurrent almost to the base of the stipes. Sori terminal, free; indusium orbicular | 4. <i>H. australe</i> . |
| Fronds 2-3 in., linear-oblong, dull dark-green. Rhachis with a broad flat wing decurrent almost to the base of the stipes. Sori terminal, free; indusium ovate, margins often jagged | 5. <i>H. atrovirens</i> . |
| Rhizome short, bristly. Fronds 9-20 in., ovate-lanceolate, pale-green. Rhachis with a narrow flat wing decurrent down the stipes. Sori terminal, free; indusium orbicular | 6. <i>H. pulcherri-
mum</i> . |
| Rhizome long, glabrous. Fronds 9-20 in., ovate-lanceolate; segments broad, flat. Rhachis with a narrow flat wing decurrent along the stipes. Sori terminal, immersed; indusium orbicular | 7. <i>H. dilatatum</i> . |

†† Rhachis winged only towards the top; lower part and stipes naked (often narrowly winged in *H. demissum*).

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|--|-------------------------|
| Fronds 4-12 in., ovate-deltoid, bright-green; stipes and rhachis glabrous. Sori terminal, free; indusium ovate | 8. <i>H. demissum</i> . |
|--|-------------------------|

- Fronde 6-20 in., ovate-lanceolate, brownish-green; stipes and rhachis bristly. Sori terminal; indusium orbicular .. 9. *H. scabrum*.
 Fronde 3-9 in., pale glistening-green; lower pinnae often flabellate. Stipes woolly at the base. Sori terminal, small; indusium broadly ovate or orbicular .. 10. *H. flabellatum*.
 Fronde $\frac{1}{2}$ -1 $\frac{1}{2}$ in., deltoid, very delicate. Stipes, rhachis, and costae with silky flexuous hairs. Sori terminal, small, partly immersed; indusium ovate-orbicular .. 11. *H. rufescens*.

** Fronde with the margins and both surfaces densely clothed with stellate hairs.

- Fronde 2-6 in., oblong; rhachis broadly winged throughout, the wing decurrent along the upper part of the stipes. Sori terminal, immersed .. 12. *H. ciliatum*.
 Fronde 2-10 in., oblong-lanceolate; rhachis winged only towards the top; stipes naked. Sori terminal, immersed .. 13. *H. subtilissimum*.
 Fronde 2-8 in., linear-oblong, rigid and coriaceous, everywhere hidden by dense tomentum; rhachis not winged. Sori terminal, free .. 14. *H. Malingii*.

B. Leptocionium. Margins of the frond spinulose-dentate.

- Fronde minute, $\frac{1}{4}$ -1 in., simple or forked or digitately divided. Indusium with entire valves .. 15. *H. Cheesemanii*.
 Fronde minute, $\frac{1}{4}$ -1 in., pinnatifid. Sori solitary, free, terminating the main rhachis; indusium with the valves spinulose on the back and margins .. 16. *H. minimum*.
 Fronde 1-4 in., pinnate; pinnae divided. Sori lateral, near the base of the pinnae, free; indusium with the valves smooth on the back, spinulose-dentate on the margins .. 17. *H. Tunbridgense*.
 Fronde 1-4 in., pinnate; pinnae divided. Sori lateral, near the base of the pinnae, free; indusium with the valves smooth on the back; margins entire .. 18. *H. unilaterale*.
 Fronde 4-8 in., 3-4-pinnatifid. Sori lateral, near the base of the pinnae, free; indusium large, often decurved, obovoid; valves with entire margins .. 19. *H. multifidum*.
 Fronde 6-12 in., 3-4-pinnatifid. Sori terminal, immersed in the tips of the segments; indusium ovate-orbicular, valves with entire margins .. 20. *H. bivalve*.

1. *H. rarum*, *R. Br. Prodr.* 159.—A very delicate pale glistening-green pellucid species, forming matted patches on the trunks of trees or on rocks. Rhizomes creeping, much branched, very slender, wiry, black. Fronde very variable in size and shape, usually from 1 to 4 in. long, but sometimes dwarfed to $\frac{1}{2}$ in., and occasionally lengthened out to 6 or 8 in., broadly oblong to linear-oblong, 2-pinnatifid, in large specimens pinnate at the base, pendulous, membranous, flaccid, quite glabrous. Stipes extremely slender, capillary, often half the length of the whole frond; main rhachis usually winged throughout. Pinnae close, often overlapping, once or twice forked or pinnatifid, rarely simple. Segments erecto-patent, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, $\frac{1}{10}$ in. broad, flat, obtuse, quite entire. Sori mostly near the summit of the frond, sunk in the tips of the segments. Indusium large, almost as broad as the segments,

broadly rhomboid, divided half-way down, cuneate at the base; valves broad, rounded.—*Hook. Sp. Fil.* i. 101; *Hook. f. Fl. Antarct.* i. 105; *Fl. Nov. Zel.* ii. 12; *Handb. N.Z. Fl.* 353; *Hook. and Bak. Syn. Fil.* 58; *Benth. Fl. Austral.* vii. 705; *Thoms. N.Z. Ferns*, 38. *H. semibivalve*, *Hook. and Grev. Ic. Fil.* t. 83; *A. Rich. Fl. Nouv. Zel.* 94; *A. Cunn. Precur.* n. 241; *Raoul, Choix*, 39. *H. imbricatum*, *Col. in Tasm. Journ. Nat. Sci.* (1845) 27.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: From Mongonui and Kaitia southwards, not uncommon. Sea-level to 3000 ft.

A widely distributed plant, found in Australia and Tasmania, Polynesia, Japan, South Africa and Mauritius, and extratropical South America. It is easily recognised by the extremely slender capillary stipes, pendulous pale glaucous-green fronds, broad flat entire segments, and large orbicular sori. When growing in exposed places it is often much dwarfed, with closely imbricating pinnæ, constituting Colenso's *H. imbricatum*.

2. ***H. polyanthos***, Swartz, *Syn. Fil.* 149; var. ***sanguinolentum*** *Hook. Sp. Fil.* i. 107.—Forming matted patches on the trunks or branches of trees or on rotten logs. Rhizome rather stout, creeping, much branched, usually bristly with reddish-brown hairs. Fronds erect or decurved, somewhat opaque, dull olive-green, reddish-brown when dry, 2–9 in. high, broadly ovate or oblong, 3-pinnatifid, glabrous or the stipes and rhachis with scattered red-brown hairs when young. Stipes rather stout, narrowly winged above; rhachis broadly winged throughout, stout, flexuose. Primary pinnæ close or rather distant, spreading, rarely decurved; secondary short, deeply pinnatifid. Segments narrow-linear, obtuse, flat or the margins undulate. Sori mainly in the upper part of the frond, usually terminating short somewhat contracted lateral segments, quite free or very slightly sunk at the base. Indusium broader than the segment, broadly ovate or suborbicular, 2-valved to the base; valves obtuse, entire or slightly sinuate, often crested on the back.—*Hook. f. Fl. Nov. Zel.* ii. 14; *Handb. N.Z. Fl.* 354; *Hook. and Bak. Syn. Fil.* 60; *Thoms. N.Z. Ferns*, 38; *Field, N.Z. Ferns*, 58, t. 28, f. 7. *H. sanguinolentum*, Swartz, *Syn. Fil.* 148, 376; *A. Rich. Fl. Nouv. Zel.* 93; *A. Cunn. Precur.* n. 234; *Raoul, Choix*, 38. *H. lophocarpum*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 255. *Trichomanes sanguinolentum*, *Forst. Prodr.* n. 465.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Abundant in forests throughout. Sea-level to 3000 ft.

One of the most abundant species of the genus in New Zealand. It stains paper brown when drying, and gives off a peculiar odour, which it often retains for years. The species, in some of its forms, is found in almost all tropical countries, but apparently not in Australia.

3. ***H. villosum***, *Col. in Tasm. Journ. Nat. Sc.* (1845) 25.—Forming dense matted patches on the trunks of trees or amongst moss. Rhizome much branched, wiry, creeping. Fronds erect or

decurved, opaque, dull brownish-green, 2-6 in. long, 1-2½ in. broad, broadly ovate to ovate-lanceolate, acuminate, 3-4-pinnatifid. Stipes 1-3 in. long, usually narrowly winged above, villous with scattered spreading hairs; rhachis narrowly winged throughout, rather slender, flexuous, more or less villous, as are the partial rhachides and costæ. Primary pinnæ closely placed, often overlapping, lanceolate-deltoid; secondary rhombic-ovate, again once or twice pinnatifid. Ultimate segments crowded, very narrow, linear, obtuse, flat. Sori numerous, terminating the segments, free. Indusium broadly ovate, obtuse or subacute, broader than the segments, 2-valved to the base; valves smooth, entire.—*Kirk in Trans. N.Z. Inst.* x. (1878) 395; *Bak. in Annals Bot.* v. (1890-91) 192; *Thoms. N.Z. Ferns*, 39.

NORTH ISLAND: Auckland—Summit of Moehau (Cape Colville), *Adams!* Te Aroha Mountain, *T. F. C.*; Tarawera Mountain, *Kirk*; Ruatahuna, *Colenso!* Hawke's Bay—Tukituki River, *A. Hamilton!* Ruahine Mountains, *H. Hill!* Wellington—Taratua Range, *H. H. Travers!* SOUTH ISLAND: Not uncommon in subalpine forests throughout. STEWART ISLAND: Mount Anglem, *Kirk*. AUCKLAND ISLANDS: *Kirk*. Usually from 2000-4500 ft., but descends almost to sea-level in Westland.

This was placed with *H. polyanthos* by Hooker, and is doubtless closely allied to it. But it differs markedly in the much more finely cut 4-pinnatifid fronds, in the villous stipes, rhachis, &c., in the much narrower segments, and in the smaller sori.

4. *H. australe*, *Willd. Sp. Plant.* v. 527.—Forming matted patches on rocks or among moss, more rarely on the trunks of trees, pale-green when young, becoming lurid-green in age. Rhizome creeping, branched, wiry. Fronds erect or decurved, very membranous, 3-9 in. long, 1½-4 in. broad, triangular with usually a broad base, acuminate, quite glabrous, 2-3-pinnatifid. Rhachis with a broad much-cripsed wing which extends almost to the base of the stipes. Primary pinnæ $\frac{3}{4}$ -2 in. long, rhomboidal-lanceolate, spreading, often decurved at the tips, deeply pinnatifid; secondary again pinnatifid or irregularly forked. Ultimate segments narrow-linear, obtuse, quite entire, more or less crisped, rarely flat. Sori usually numerous, terminal on the segments, free. Indusium orbicular or broadly ovate, usually broader than the segments, 2-valved to the base; valves broad, rounded, entire or slightly erose.—*Bak. Annals Bot.* v. (1890-91) 193. *H. javanicum*, *Spreng. Syst.* iv. 132; *Hook. and Bak. Syn. Fil.* 60; *Thoms. N.Z. Ferns*, 39; *Field, N.Z. Ferns*, 61, t. 15, f. 4. *H. crispatum*, *Wall. Cat.* 169; *Hook. Sp. Fil.* i. 105; *Hook. f. Fl. Nov. Zel.* ii. 13; *Handb. N.Z. Fl.* 354. *H. flexuosum*, *A. Cunn. Precur.* n. 238; *Raoul, Choix*, 39.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in damp woods. Sea-level to 2000 ft.

A common plant in Tasmania, and from thence extending northwards to Malaya, India, and Ceylon. It is easily distinguished from the other New Zealand species by the broad conspicuously crisped wing of the rhachis and stipes.

5. **H. atrovirens**, *Col. in Tasm. Journ. Nat. Sc.* (1845) 26. — Usually terrestrial. Rhizome slender, wiry, creeping. Fronds few, somewhat rigidly erect, membranous, dull dark-green, 2-6 in. high, $\frac{1}{2}$ -1 in. broad, linear-oblong or lanceolate, quite glabrous, 2-pinnatifid. Stipes about half the length of the frond, winged almost to the base; rhachis flexuose, winged throughout, wings flat, not crisped. Pinnæ 5-10 on each side, alternate, the lowest usually the largest, $\frac{1}{3}$ - $\frac{2}{3}$ in. long, erecto-patent, irregularly pinnatifid. Segments simple or forked, linear, obtuse, flat, quite entire. Sori few, terminating the segments, quite free. Indusium small, ovate, 2-valved almost to the base, slightly broader than the segments; valves obtuse or subacute, entire or jagged.—*H. javanicum* var. *atrovirens*, *Hook. and Bak. Syn. Fil.* 60. *H. montanum*, *Kirk in Trans. N.Z. Inst.* x. (1878) 394; *Thoms. N.Z. Ferns*, 40; *Field, N.Z. Ferns*, 61, t. 28, f. 1.

NORTH ISLAND: Auckland—Bay of Islands, *Miss Clarke!* Whangarei, *T. F. C.*; ravines at Mamaku, near Rotorua, *J. Stewart!* Lake Waikaremoana, *Colenso!* SOUTH ISLAND: Nelson—Blind Bay, *Kingsley.* Otago—Mountains at the head of Lake Wakatipu, *Mrs. Mason!* Sea-level to 2500 ft.

I have ventured to restore Mr. Colenso's *H. atrovirens* to the rank of a species, for although undoubtedly very close to *A. australe* it appears to differ sufficiently in the much smaller and narrower more sparingly divided frond, in the flat (not crisped) wings to the rhachis and stipes, and in the narrower segments and smaller ovate indusia. Mr. Kirk's *H. montanum* is clearly the same plant, with the indusia conspicuously jagged. Whether the Australian plant included under *atrovirens* by Baker is also identical I am unable to say, not having seen specimens.

6. **H. pulcherrimum**, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 25.—Forming dense tufts on the branches and trunks of trees. Rhizome short, stout, densely clothed with shining red-brown bristly scales; rootlets woolly. Fronds very handsome, pale-green, erect or pendulous, 9-30 in. long including the stipes, 2-6 in. broad, ovate-lanceolate or linear-oblong, acuminate, membranous, flaccid, quite glabrous, 3-4-pinnatifid. Stipes 2-6 in. long, winged to the base; rhachis also with a narrow wing throughout its length, wings not crisped. Primary pinnæ $1\frac{1}{2}$ -3 in. long, rhomboidal-lanceolate, 2-pinnatifid down to a narrowly winged flexuous rhachis. Ultimate segments simple or forked, linear, flat, obtuse or retuse, quite entire. Sori terminating short lateral segments, sometimes apparently axillary, quite free. Indusium orbicular, 2-valved to the base; valves convex, quite entire.—*Hook. Sp. Fil.* i. 103, t. 37A; *Hook. f. Fl. Nov. Zel.* ii. 13, t. 74; *Handb. N.Z. Fl.* 354; *Hook. and Bak. Syn. Fil.* 62; *Thoms. N.Z. Ferns*, 41; *Field, N.Z. Ferns*, 60, t. 20, f. 6.

NORTH ISLAND: Mountainous forests of the interior, from Te Aroha and Lake Waikaremoana southwards. SOUTH ISLAND: Rare and local in Nelson, Marlborough, and Canterbury; abundant in Westland and Otago. STEWART ISLAND: Paterson's Inlet, *Kirk!* Sea-level to 3000 ft.

A very distinct species, confined to New Zealand.

7. *H. dilatatum*, Swartz, *Syn. Fil.* 149, 373.—Large, very handsome, bright-green, clothing the trunks of trees or rotten logs. Rhizome long, stout, wiry, glabrous. Fronds variable in size, usually 9–18 in. long including the stipes, but luxuriant specimens often reach 2 ft. or more, the smaller specimens erect or decurved, the larger usually pendulous, 3–6 in. broad, ovate or ovate-lanceolate to linear-oblong, membranous, 3-pinnatifid. Stipes 2–6 in. long, terete, wiry, narrowly winged almost to the base; rhachis winged throughout, the wing flat, not crisped. Primary pinnae $1\frac{1}{2}$ –3 in. long, ovate-lanceolate, cuneate at the base; secondary broad, almost subpalmate below, irregularly pinnatifid. Ultimate segments linear, often elongated and decurved, about $\frac{1}{10}$ in. broad, obtuse, flat, quite entire. Sori numerous, terminating the segments, sunk in the frond at the base. Indusium orbicular, cuneate at the base, 2-valved more than half-way down; valves convex, rounded at the tip, entire; clusters of sporangia often exserted.—*Hook. and Grev. Ic. Fil.* t. 60; *A. Cunn. Precur.* n. 233; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 104; *Hook. f. Fl. Nov. Zel.* ii. 13; *Handb. N.Z. Fl.* 354; *Hook. and Bak. Syn. Fil.* 62; *Thoms. N.Z. Ferns*, 40; *Field, N.Z. Ferns*, 59, t. 16, f. 1. *Trichomanes dilatatum*, *Forst. Prodr.* n. 467.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in damp woods throughout. AUCKLAND ISLANDS: *Sir J. D. Hooker* (*Handbook*). Sea-level to 3000 ft.

Also in several of the Polynesian islands and in Java. One of the most handsome species of the genus.

8. *H. demissum*, Swartz, *Syn. Fil.* 147, 374.—Terrestrial or epiphytic, forming large patches. Rhizome long, wiry, creeping. Fronds erect or decurved, membranous, bright pale-green, 4–16 in. long including the stipes, 2–5 in. broad, ovate-deltoid or ovate-lanceolate, acuminate, 3–4-pinnatifid. Stipes 2–6 in. long, terete, smooth and glabrous, wiry, not winged above or very obscurely so; rhachis obviously winged in the upper part, but the wing much narrowed and sometimes obsolete below. Primary pinnae spreading or ascending, rhombic-lanceolate or rhombic-triangular; secondary short, broad, again 1–2-pinnatifid. Ultimate segments $\frac{1}{10}$ – $\frac{1}{8}$ in. long, $\frac{1}{20}$ in. broad, linear, obtuse, flat, quite entire. Sori small, very numerous at the tips of the segments, not confined to the lateral ones, not sunk in the frond. Indusium ovate, obtuse or subacute, 2-valved to the base; valves entire or lobed.—*A. Rich. Fl. Nouv. Zel.* 92; *A. Cunn. Precur.* n. 245; *Raoul, Choix*, 39; *Hook. Sp. Fil.* i. 109; *Hook. f. Fl. Nov. Zel.* ii. 14; *Handb. N.Z. Fl.* 354; *Hook. and Bak. Syn. Fil.* 61; *Thoms. N.Z. Ferns*, 41; *Field, N.Z. Ferns*, 58, t. 18, f. 1. *H. erecto-alatum*, *Col. in Trans. N.Z. Inst.* xi. (1879) 431. *H. megalocarpum*, *Col. l.c.* xv. (1883) 318. *H. polychilum*, *Col. l.c.* xxiv. (1892) 395. *Trichomanes demissum*, *Forst. Prodr.* n. 468.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Abundant in woods throughout. Sea-level to 3000 ft.

Also found in Polynesia, Java, and the Philippine Islands. The veinlets often fork towards the tips of the segments, and in profusely fruited specimens there is usually a sorus at the tip of each veinlet. When the fork of the veinlet is very close to the tip of the segment the two sori are often included in a single indusium, the valves of which, however, are more or less cleft at the apex. All gradations can be traced between two indusia placed side by side, and a single indusium containing 2 receptacles. Mr. Colenso's *H. megalocarpum* and *H. polychilum*, named specimens of which appear to me to be identical, are founded mainly on this peculiarity, and show no other differences. His *H. erecto-alatum* was separated on account of the broader crisped wing of the rachis, but the type specimens prove this character to be a very obscure and uncertain one.

9. *H. scabrum*, *A. Rich. Fl. Nouv. Zel.* 90, t. 14, f. 1.—Usually clothing the trunks of trees, rarely terrestrial. Rhizome long, creeping, wiry, more or less bristly with reddish-brown scales. Fronds very variable in size, usually from 6 in. to 20 in. long, but luxuriant specimens sometimes attain 30 in., 2–5 in. broad, ovate-deltoid or ovate-lanceolate or linear-oblong, acuminate, membranous, dark olive-green or olive-brown, erect or pendulous, 3–4-pinnatifid. Stipes 2–6 in. long, not winged, more or less densely clothed (as are the primary and secondary rhachides and costæ) with reddish-brown jointed hairs; rhachis winged above, wingless below. Primary pinnæ 1–3 in. long, close or rather distant, spreading or erecto-patent, rhomboidal-lanceolate or -oblong, acuminate; secondary deeply pinnatifid or 2-pinnatifid. Ultimate segments linear, obtuse, flat, quite entire. Sori numerous, terminal on the lateral segments on both sides of the pinna. Indusium rather small, orbicular or ovate-orbicular, 2-valved to the base; valves usually toothed.—*A. Cunn. Precur.* n. 235; *Raoul, Choix*, 39; *Hook. Sp. Fil.* i. 110; *Hook. f. Fl. Nov. Zel.* ii. 15; *Handb. N.Z. Fl.* 355; *Hook. and Bak. Syn. Fil.* 61; *Thoms. N.Z. Ferns*, 42; *Field, N.Z. Ferns*, 62, t. 17, f. 4. *Sphærocionium glanduliferum*, *Presl. Epimel.* 23, t. 12.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Moist forests from Hokianga southwards, not uncommon. Sea-level to 3000 ft.

A distinct and beautiful species, easily recognised by the reddish hairs on the stipes, rhachis, and costæ, and by the dark colour of the frond. It is confined to New Zealand.

10. *H. flabellatum*, *Lab. Pl. Nov. Holl.* ii. 101, t. 250.—Densely matted, usually clothing the trunks of trees. Rhizomes long, wiry, creeping, often much branched and interlaced, more or less clothed with yellow-brown woolly hairs. Fronds very variable in size and shape, usually 3–9 in. long, but sometimes reduced to less than 1 in., at other times attaining a length of 12 in., the smaller specimens generally ovate and erect, the longer ovate-lanceolate to lanceolate or linear-oblong and pendulous, pale shining-green or

yellow-green, membranous, glabrous or sparingly silky along the rhachis and sometimes on the margins, 2-3-pinnatifid. Stipes slender, terete, wingless, glabrous except a tuft of silky hairs at the base; main rhachis winged towards the top, wingless elsewhere. Primary pinnæ often close and overlapping, short, rhomboidal-ovate or flabellate, acuminate; secondary cuneate at the base, deeply pinnatifid. Ultimate segments linear, flat, entire. Sori small, terminal on the segments, usually on the lateral ones, slightly immersed at the base. Indusium orbicular or nearly so, 2-valved to below the middle; valves usually entire.—*Hook. Sp. Fil.* i. 111; *Hook. f. Fl. Nov. Zel.* ii. 15; *Handb. N.Z. Fl.* 355; *Hook. and Bak. Syn. Fil.* 61; *Benth. Fl. Austral.* vii. 705; *Thoms. N.Z. Ferns*, 42; *Field, N.Z. Ferns*, 57, t. 19, f. 6. *H. nitens*, *R. Br. Prodr.* 159; *A. Rich. Fl. Nouv. Zel.* 94; *A. Cunn. Precur.* n. 236; *Raoul, Choix*, 39.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Not uncommon in woods throughout. Sea-level to 2500 ft.

Also in Tasmania and south-eastern Australia, and reported from Sumatra and the Philippine Islands. Some varieties approach very closely to narrow-fronded forms of *H. demissum*, but in its ordinary state it cannot be easily confounded with any other.

11. *H. rufescens*, *T. Kirk in Trans. N.Z. Inst.* xi. (1879) 457, t. 19A.—Very delicate, forming mats on the trunks of trees or on the perpendicular faces of shaded rocks. Rhizome very slender, almost filiform, branched, creeping, sparingly clothed with soft spreading hairs. Stipes much longer than the frond proper, 1-2 in., capillary, wingless, clothed when young with long flexuous hairs. Fronds $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad at the base, deltoid, delicately membranous and pellucid, 2-pinnatifid; rhachis winged almost to the base, and with the veins and occasionally the surfaces of the frond more or less covered with long flexuous silky hairs. Pinnæ 3-4 pairs, close, overlapping, cuneate-rhomboid or the lowest almost flabellate, deeply pinnatifid or lobed. Segments linear, obtuse, flat, quite entire. Sori terminating the segments, slightly immersed at the base. Indusium ovate-orbicular, 2-valved to the base; valves entire or slightly toothed, often ciliate.—*Bak. in Annals of Bot.* v. (1890-91) 192; *Thoms. N.Z. Ferns*, 43; *Field, N.Z. Ferns*, 63, t. 15, f. 6.

NORTH ISLAND: Summit of Te Aroha Mountain, *Adams! T. F. C.*; Oroua River (Ruahine Range), *H. C. Field!* Mount Egmont Ranges, *T. F. C.* SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C.*; Takaka Valley, *Kingsley*; Mount Rochfort, *Rev. F. J. Spencer!* Westland—Okarito, *A. Hamilton!* STEWART ISLAND: *Rakiahua*, *A. Hamilton*, *P. Goyen*. 1000-3500 ft.

Nearest to *H. flabellatum*, some mountain forms of which approach it very closely, but separated by the much longer capillary stipes, shorter, broader, and more delicate fronds, and by the copious hairs. *H. subtilissimum* differs in the larger size, the shape of the frond, and in the stellate tomentum.

12. **H. ciliatum**, Swartz, *Syn. Fil.* 147.—Usually epiphytical. Rhizome slender, creeping, 1–2 in. long. Fronds 2–6 in. long, 1–2 in. broad, ovate-oblong, acuminate, thin and membranous, 2–3-pinnatifid, more or less clothed with stalked branched or stellate hairs, which are most abundant on the margins. Stipes 1–2 in. long, winged above and ciliated; rhachis broadly winged throughout and also conspicuously ciliated with stellate hairs. Primary pinnæ oblong or rhomboidal, cut down to a broad central portion into numerous secondary divisions, which are simple or forked or irregularly pinnatifid. Ultimate segments linear, flat, obtuse, quite entire. Sori numerous, terminating the segments, more or less immersed. Indusium suborbicular, 2-valved half-way down; valves ciliated.—*Hook. f. Handb. N.Z. Fl.* 747; *Hook. and Bak. Syn. Fil.* 63; *Thomson, N.Z. Ferns*, 43; *Field, N.Z. Ferns*, 64. *H. Boryanum*, Willd. *Sp. Plant.* v. 518; *Hook. Sp. Fil.* i. 89, t. 31c.

SOUTH ISLAND: Nelson—*Travers (Handbook)*.

An abundant plant throughout the whole of tropical America, from Cuba and Mexico to Chili; also in tropical Africa, Madagascar, and Mauritius. I have seen no New Zealand specimens, the plant not having been refound since its original discovery by Mr. Travers nearly forty years ago.

13. **H. subtilissimum**, Kunze, *Anal. Pteridog.* 50.—Forming dense mats on the stems of fern-trees and on tree-trunks, or on the perpendicular faces of shaded rocks. Rhizome long, slender, filiform, tomentose with reddish-brown hairs. Fronds 2–10 in. long, $\frac{3}{4}$ –2 in. broad, ovate-lanceolate or lanceolate, acute or acuminate, very thin and membranous, yellow-brown or tawny, usually pendulous, 2–3-pinnatifid, everywhere clothed with copious silky stellate hairs. Stipes filiform, not winged; rhachis narrowly winged above, wingless below. Primary pinnæ short, erectopatent, ovate-lanceolate, cuneate at the base; secondary irregularly pinnatifid or forked. Ultimate segments close, linear, obtuse, flat, quite entire. Sori numerous, small, terminal, sunk in the tips of the lateral segments. Indusium orbicular or broader than long, 2-valved almost to the base; valves rounded, copiously ciliated with stellate hairs.—*Hook. and Baker Syn. Fil.* 64; *Field, N.Z. Ferns*, 63, t. 15, f. 2. *H. æuginosum*, *Hook. Sp. Fil.* i. 94; *Hook. f. Fl. Nov. Zel.* ii. 15; *Handb. N.Z. Fl.* 355. *H. Franklinianum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 23.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Damp forests from the Bay of Islands southwards, not uncommon, except on the east coast of the South Island, where it is rare and local. Sea-level to 2500 ft.

Also on the Island of Juan Fernandez and in Chili, and closely allied to the Tristan d'Acunha *H. æuginosum*, Carm., with which it was united by Sir J. D. Hooker.

14. **H. Malingii**, *Metten. ex Hook. and Bak. Syn. Fil.* 66.—Forming small patches on the trunks and branches of trees. Rhizome slender, creeping, sparsely clothed with reddish-brown hairs. Fronds 2–8 in. long, $\frac{1}{2}$ – $1\frac{1}{2}$ in. broad, narrow-oblong to linear, erect or pendulous, opaque, rigid, reddish-brown or greyish-brown, everywhere most densely covered with stellate hairs mixed with very minute close-set clavate papillæ, 2–3-pinnatifid. Stipes 1–3 in. long, very slender, almost filiform, not winged, densely tomentose. Pinnæ close or distant, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, rarely more, the lower ones ovate-rhomboidal, the upper oblong, deeply pinnatifid; secondary divisions cuneate or flabellate, deeply pinnatifidly cut. Ultimate segments very narrow-linear, obtuse, almost terete and coriaceous from the dense coating of tomentum, which entirely conceals the frond proper. Sori small, terminating the segments. Indusium hidden by the tomentum, orbicular, 2-valved rather more than half-way down; valves denticulate at the apex.—*Thoms. N.Z. Ferns*, 44; *Field, N.Z. Ferns*, 67, t. 7, f. 2. *Trichomanes Malingii*, *Hook. Garden Ferns*, t. 64; *Hook. f. Handb. N.Z. Fl.* 357.

NORTH ISLAND: Summit of Te Aroha Mountain, *Adams! T. F. C.*; Mount Egmont, *Mrs. Jones, T. F. C.*; Ruahine Mountains and base of Ruapehu, *H. C. Field*. SOUTH ISLAND: Nelson—Mountains behind Massacre Bay, *Maling*; Takaka, *Kingsley*. Westland—Mountains near Greymouth, *Enys!* near Kumara, *J. M. Brame!* Franz Josef Glacier, *Haast*. Canterbury—Banks Peninsula, *T. H. Potts!* Otago—Mount Cargill, Pine Hill, *Buchanan!* *Thomson!* 500–3500 ft.

A most curious and remarkable little plant, confined to New Zealand. The peculiar indumentum of the frond is well worth careful examination.

15. **H. Cheesemanii**, *Bak. ex Hook. and Bak. Syn. Fil.* (edit. 2) 464.—Minute, forming cushions on the branches of trees, or creeping amongst mosses and hepaticæ. Rhizome branched, wide-creeping, smooth and wiry. Fronds very small, $\frac{1}{4}$ –1 in. long, simple or forked or digitately 3–5-fid, quite glabrous, dark-green, texture firm. Stipes very short, filiform, $\frac{1}{8}$ – $\frac{1}{4}$ in. long. Segments about $\frac{1}{10}$ in. broad, linear-oblong or ligulate, obtuse, with a single stout dark-coloured costa in each; margins not usually conspicuously thickened, strongly ciliate-dentate; teeth ascending, dark-brown or black, sometimes caducous. Sori 1–3 to a frond, terminating the segments. Indusium slightly sunk in the frond at the base, orbicular-oblong, dark brownish-black, of a more compact texture than the frond, 2-valved nearly to the base; valves smooth, convex, quite entire, recurved in age.— *Ic. Plant.* t. 1132; *Cheesem. in Trans. N.Z. Inst.* viii. (1876) 329; *Thoms. N.Z. Ferns*, 36; *Field, N.Z. Ferns*, 65, t. 5, f. 3.

Var. **Armstrongii**.—Precisely similar in size and habit, but texture firmer and margins strongly thickened.—*H. Armstrongii*, *Kirk in Trans. N.Z. Inst.* x. (1878) App. 43, t. 21A; *Bak. Ic. Plant.* t. 1614. *H. melanocheilos*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 255. *Trichomanes Armstrongii*, *Bak. ex Hook. and Bak. Syn. Fil.* (edit. 2) 465.

NORTH ISLAND: Auckland—Whangaroa, *R. W. Rowson*! Great Barrier Island, *Kirk*! Whangarei, Coromandel, Thames, Titirangi, Hunua, *T. F. C.*; Te Aroha Mountain, *Adams*! SOUTH ISLAND: Nelson—Mokihinui, *Kirk*! Canterbury—Upper Waimakariri, Arthur's Pass, *Armstrong*! *Enys*! *Kirk*! *T. F. C.* Westland—Hokitika, *Kirk*; Kumara, *J. M. Brame*; Okarito, *A. Hamilton*! STEWART ISLAND: Ruggedy Mountains, *Kirk*. Sea-level to 3500 ft.

A peculiar little species, usually found among moss on the upper branches of forest-trees, or on the perpendicular faces of rocks. I am unable to maintain *H. Armstrongii* as a separate species, for the stout marginal nerve, which is supposed to separate it from *H. Cheesemanii*, is an inconstant character, and fronds may be picked from the same rhizome with or without it. Usually, however, epiphytic specimens want the nerve, and rupestral ones possess it.

16. *H. minimum*, *A. Rich. Fl. Nouv. Zel.* 91, t. 14, f. 2.—Minute, forming matted patches on rocks or on the trunks of trees. Rhizome much branched, filiform, wide-creeping, glabrous or sparingly bristly. Stipes wiry, filiform, naked, $\frac{1}{6}$ – $\frac{1}{2}$ in. long. Fronds very small, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, broadly oblong-deltoid or ovate, erect or recurved, firm, pale-green when fresh, often reddish-brown when dry, pinnatifid or pinnate at the base. Segments 2–6 pairs, close, spreading, simple or the lower ones forked, linear, obtuse, more or less concave, rigid, quite glabrous; margins spinulose-dentate. Sori never more than one to a frond, terminating the main rhachis, stipitate, quite free. Indusium rather large, obovate-cuneate, narrowed at the base, 2-valved to the middle; valves spinulose on the back; margins rounded, sharply spinulose-dentate. Receptacle stout, often exserted in age.—*A. Cum. Precur.* n. 242; *Raoul, Choix*, 39; *Hook. f. Fl. Antarct.* i. 103; *Fl. Nov. Zel.* ii. 12; *Handb. N.Z. Fl.* 353; *Hook. and Bak. Syn. Fil.* (edit. 2) 464; *Thoms. N.Z. Ferns*, 36.

SOUTH ISLAND: Nelson—Tasman Bay, *D'Urville*. Westland—Coast near Okarito, *A. Hamilton*! Otago—Resolution Island, *Enys*! East Coast, *Buchanan*! *A. Hamilton*! STEWART ISLAND: Not uncommon, *Kirk*! AUCKLAND ISLANDS: Scarce, *Sir J. D. Hooker*.

A much misunderstood species; most collectors confusing it with small forms of *H. Tunbridgense*, from which, however, it is readily distinguished by the uniformly solitary and terminal sori, the indusium of which is spinulose on the back as well as on the margins. It appears to be a littoral plant, never found far from the sea.

17. *H. Tunbridgense*, *Smith, Fl. Brit.* 1141.—Forming broad densely matted moss-like patches on rocks or on the trunks of trees. Rhizome much branched, long, wiry, creeping. Fronds variable in size, $\frac{1}{2}$ –3 in. long, $\frac{1}{2}$ –1 in. broad, oblong or linear-oblong, pale-green, membranous, pinnate below, pinnatifid above. Stipes $\frac{1}{2}$ –1 $\frac{1}{2}$ in. long, slender, wiry, naked; rhachis winged above, wingless below, or sometimes the wing is decurrent almost to the lowest pinna. Pinnæ spreading, close or rather remote, usually flabellately pinnatifid. Segments 3–12 to a pinna, linear, obtuse, flat, conspicuously spinulose-dentate. Sori terminal on a short lateral seg-

ment near the base of the pinnæ on their upper margin and hence supra-axillary, rarely more than one to a pinna. Indusium sub-orbicular, compressed, its base slightly immersed in the segment, deeply 2-valved; valves thin, smooth on the back; margins conspicuously spinulose-dentate.—*A. Rich. Fl. Nouv. Zel.* 91; *A. Cunn. Precur.* n. 243; *Raoul, Choix*, 39; *Hook. Sp. Fil.* i. 95; *Hook. f. Fl. Nov. Zel.* ii. 11; *Handb. N.Z. Fl.* 352; *Hook. and Bak. Syn. Fil.* 67; *Thoms. N.Z. Ferns*, 35; *Field, N.Z. Ferns*, 65, t. 14, f. 7. *H. pusillum*, *Col. in Trans. N.Z. Inst.* xii. (1880) 365; (?) *H. pygmæum*, *Col. l.c.* xiii. (1881) 376. *H. zeelandicum*, *Van der Bosch*.

Var. *cupressiforme*, *Hook. f. Fl. Nov. Zel.* ii. 11.—Fronds taller and narrower, more erect, 1-4 in. high. Pinnæ distant; segments more rigid, narrower, often decurved. Sori free, almost stipitate.—*H. cupressiforme*, *Labill. Pl. Nov. Holl.* ii. 102, t. 250. *H. revolutum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 26.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Abundant throughout. Sea-level to 3000 ft.

An abundant plant in most temperate and subtropical countries, and everywhere highly variable. *Var. cupressiforme* has much of the habit of the next species, but the valves of the indusium are spinulose-dentate.

18. ***H. unilaterale***, *Willd. Sp. Plant.* v. 521.—Forming large patches on the ground among moss or on the roots of trees. Rhizome long, creeping, branched. Fronds 1-4 in. long, linear-oblong, dark-green, rigidly membranous, pinnate below, pinnatifid above. Stipes $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, slender, wiry, naked; rhachis winged in the upper portion only. Pinnæ narrower and more rigid than in *H. Tunbridgense*, often pinnatifid on the upper side alone. Segments fewer and narrower, frequently decurved, usually involute, margins conspicuously spinulose-dentate. Sori terminal on short lateral segments near the base of the pinnæ on their upper margin, exactly as in *H. Tunbridgense*. Indusium obovate-oblong or broadly oblong, turgid, slightly immersed at the base, deeply 2-valved; valves smooth; margins quite entire.—*Hook. f. Fl. Nov. Zel.* ii. 11; *Fl. Tasm.* ii. 134; *Handb. N.Z. Fl.* 353. *H. Wilsoni*, *Hook. Brit. Fl.* (edit. 1) 450; *Sp. Fil.* i. 95. *H. Tunbridgense* var. *Wilsoni*, *Hook. and Bak. Syn. Fil.* 67.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From Te Aroha Mountain southwards, not common, chiefly in mountain forests. Sea-level to 3500 ft.

Very closely allied to *H. Tunbridgense*, and sometimes hardly to be distinguished from it in the absence of fruit, but usually the frond is taller and narrower and more rigid, the pinnæ are sparingly divided and decurved, the segments often unilateral, and the indusia narrower and more turgid, with the margins of the valves quite entire. Its geographical range is nearly the same as that of *H. Tunbridgense*, but it is a much less abundant plant.

19. ***H. multifidum***, *Swartz, Syn. Fil.* 149, 378.—Forming matted patches upon the ground or on the trunks or branches of trees. Rhizome much branched, creeping, wiry. Fronds variable.

in size, usually 4-8 in. high including the stipes, but sometimes dwarfed to 1 in., and occasionally attaining 12 in., ovate-lanceolate to oblong-ovate or deltoid, acute or acuminate, erect or decurved or even pendulous, dark olive-green to light-green, membranous, 3-4-pinnatifid. Stipes 1-5 in. long, terete, wiry, naked; rhachis narrowly winged above. Primary pinnæ close and often overlapping in terrestrial specimens, more remote in those growing on trees, rhomboidal-lanceolate, cut down to a rather broadly winged rhachis into numerous secondary divisions, which are again pinnatifid or 2-pinnatifid. Ultimate segments linear, rigid, obtuse, deeply spinulose-dentate. Sori few, large, mostly in the upper part of the frond, terminating very short lateral segments, often appearing quite axillary, free. Indusium erect or decurved, obovoid, tubular below, 2-valved to the middle; valves entire or denticulate.—*A. Cunn. Precur.* n. 240; *Raoul, Choix*, 39; *Hook. and Grev. Ic. Fil.* t. 167; *Hook. Sp. Fil.* i. 98; *Hook. f. Fl. Nov. Zel.* ii. 12; *Handb. N.Z. Fl.* 353; *Hook. and Bak. Syn. Fil.* 69; *Thoms. N.Z. Ferns*, 37; *Field, N.Z. Ferns*, 66, t. 19, f. 8. *H. truncatum*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 390. *H. alpinum*, *Col. l.c.* xxxi. (1899) 263. *H. oligocarpum*, *Col. l.c.* xxxi. (1899) 264. *Trichomanes multifidum*, *Forst. Prodr.* n. 473.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant throughout. Sea-level to 4000 ft.

Varying greatly in size and habit, but always easily recognised by the very peculiar indusium. It is also found in Fiji and others of the Pacific islands.

20. **H. bivalve**, *Swartz, Syn. Fil.* 146, 372. — Forming large matted patches on the ground among moss, more rarely epiphytically. Rhizome stout, wiry, creeping; rootlets densely villous. Fronds (including the stipes) usually from 6-9 in. high, 2-4 in. broad, but luxuriant specimens reach 12-14 in., with a breadth of 6 in., broadly ovate or deltoid, acuminate, rather rigid, often decurved, 3-4-pinnatifid. Stipes 2-5 in. long, terete, wiry, glabrous, not winged; rhachis narrowly winged above. Primary pinnæ triangular or ovate-lanceolate, acuminate, cut down almost to the rhachis into rhomboidal-lanceolate secondary divisions, which are again pinnatifid or 2-pinnatifid. Ultimate segments narrow-linear, obtuse, deeply spinulose-dentate. Sori usually numerous, terminal on the segments, immersed at the base. Indusium ovate or ovate-orbicular, cuneate below, 2-valved nearly to the base; valves quite entire.—*A. Rich. Fl. Nouv. Zel.* 93; *A. Cunn. Precur.* n. 244; *Raoul, Choix*, 39; *Hook. Sp. Fil.* i. 98, t. 35D; *Hook. f. Fl. Nov. Zel.* ii. 12; *Handb. N.Z. Fl.* 353; *Hook. and Bak. Syn. Fil.* 69; *Thomson, N.Z. Ferns*, 37; *Field, N.Z. Ferns*, 67, t. 17, f. 3. *H. spatulatum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 24. *Trichomanes bivalve*, *Forst. Prodr.* n. 466.

NORTH ISLAND : Hilly forests from the Great Barrier Island (*C. P. Winkelmann*!) and Cape Colville southwards, not common to the north of the East Cape. SOUTH ISLAND, STEWART ISLAND, CHATHAM ISLANDS : Not uncommon throughout. Sea-level to 3000 ft.

Confined to New Zealand. Allied to *H. multifidum*, but a larger and less rigid plant, of a paler-green colour, and with smaller indusia immersed in the tips of the segments, not axillary.

2. **TRICHOMANES**, Smith.

Ferns, usually of small size. Rhizome slender or rather stout, often much branched, glabrous or tomentose. Fronds compound or rarely simple and entire, of the same delicately membranous texture as *Hymenophyllum*, often pellucid, usually of a single layer of cells, rarely of 3-6 layers. Ultimate segments linear or narrow-oblong, entire or rarely toothed at the margin, with a stout central costa. Sori marginal, terminal or lateral, more or less immersed in the frond or quite free, always terminating a vein. Indusium tubular or trumpet-shaped, truncate at the mouth or with a narrow spreading lip or border, usually of the same texture as the frond. Receptacle elongated, filiform or columnar, usually exserted beyond the indusium. Sporangia sessile, depressed, surrounded by a broad complete horizontal ring, bursting transversely.

A genus of about 90 species, of almost precisely the same geographical range as *Hymenophyllum*, and agreeing with it in habit and in the delicate texture of the frond, but differing in the shape of the indusium, which is cylindrical or urceolate, and either truncate at the mouth or very shallowly 2-lipped. Of the 7 species found in New Zealand, 4 appear to be endemic, 2 occur in the Polynesian islands, one of them extending as far north as Java, the remaining one is found in Australia and Tasmania.

* Fronds simple and entire.

Fronds 2-4 in. diam., broadly reniform with a deep sinus 1. *T. reniforme*.

** Fronds small, $\frac{1}{2}$ -4 in. long, usually pendulous, delicately membranous, pinnately or 2-pinnately divided; divisions comparatively few.

Fronds $\frac{3}{4}$ -1 $\frac{1}{2}$ in., digitately or flabellately divided, margins ciliated with branched rufous hairs. Indusium obconical, immersed

Fronds 1-3 in., dull dark-green, irregularly 2-pinnatifid, segments with a single unbranched costa 2. *T. Lyallii*.

Fronds 1-4 in., pale-green, irregularly 2-pinnatifid, costa of the segments giving off numerous dichotomous veinlets 3. *T. humile*.

Fronds 1-4 in., dark-green, 2-3-pinnately divided; rhachis not winged. Segments very narrow-linear, acute; costa not branched 4. *T. venosum*.

Fronds 1-4 in., dark-green, 2-3-pinnately divided; rhachis not winged. Segments very narrow-linear, acute; costa not branched 5. *T. Colensoi*.

*** Fronds larger, 4-9 in. long, rigidly erect, subcoriaceous, 3-4-pinnatifid; divisions numerous.

Fronds lanceolate, pale yellow-green; ultimate segments narrow-linear, obtuse 6. *T. strictum*.

Fronds ovate-deltoid, dark-green; ultimate segments broad, oblong, incised at the tips 7. *T. elongatum*.

1. **T. reniforme**, *Forst. Prodr.* n. 462.—Creeping over the ground in moist forests, or clothing the trunks of trees and rotten logs. Rhizome stout, hard, rigid, wide-creeping; rootlets woolly. Stipes 2–8 in. long, erect, wiry, glabrous. Fronds 2–4 in. broad, quite entire, broadly reniform with a deep sinus, dark-green and translucent when fresh, brown and almost horny when dry, flat or undulate, glossy, quite glabrous; veins radiating from the base, numerous, close, prominent, repeatedly dichotomous, spurious venules wanting. Sori very numerous, crowded, often encircling the whole of the margin of the frond. Indusium narrow cup-shaped or almost bell-shaped. Receptacle far-exserted, stout, columnar, covered with sporangia.—*A. Rich. Fl. Nouv. Zel.* 95; *A. Cunn. Precur.* n. 228; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 115; *Exot. Ferns*, t. 2; *Hook. and Grev. Ic. Fl.* t. 31; *Hook. f. Fl. Nov. Zel.* ii. 16; *Handb. N.Z. Fl.* 356; *Hook. and Bak. Syn. Fil.* 73; *Thoms. N.Z. Ferns*, 46; *Field, N.Z. Ferns*, 68, t. 2, f. 3. *Crepidomanes reniforme*, *Presl*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: From the North Cape southwards, abundant in damp woods, except on the eastern side of Canterbury and Otago, where it is rare and local. Sea-level to 3000 ft. *Kidney-fern*; *Raurenga*.

A very distinct and beautiful species, quite unlike any other. The frond differs from that of all the other species in having from 4 to 6 layers of cellulose. It is confined to New Zealand, its reported occurrence in Australia (*Handb. N.Z. Fl.* 747) not having been confirmed.

2. **T. Lyallii**, *Hook. and Bak. Syn. Fil.* 77.—Small, pendulous, very delicate, clothing the trunks of trees in damp forests. Rhizome branched, creeping, capillary, sparingly clothed with simple or stellate red-brown hairs. Stipes 1–2 in. long, very slender, filiform. Fronds $\frac{3}{4}$ –1½ in. long and broad, deltoid or sub-orbicular in outline, delicately membranous and diaphanous, digitately or flabellately divided almost to the base. Segments simple or dichotomously branched, linear, obtuse, flat, minutely denticulate; margins ciliated with branched rufous hairs. Sori few or many to a frond, deeply sunk in the tips of the segments. Indusium obconical, the width of the mouth about equalling the depth of the tube; margins ciliated, not dilated nor bordered. Receptacle included.—*Thoms. N.Z. Ferns*, 45; *Field, N.Z. Ferns*, 70, t. 5, f. 4. *Hymenophyllum Lyallii*, *Hook. f. Fl. Nov. Zel.* ii. 16; *Handb. N.Z. Fl.* 355.

NORTH AND SOUTH ISLANDS.—From the Great Barrier Island and Cape Colville southwards, not uncommon in dense moist forests, but rare or absent on the east coast of the South Island, plentiful in Westland and the south-west of Otago. STEWART ISLAND: Mount Anglem, *Kirk*. Sea-level to 3000 ft.

Exactly intermediate between *Trichomanes* and *Hymenophyllum*, so far as the structure of the indusium is concerned. It is purely a matter of taste as to which genus it should be referred to.

3. **T. humile**, *Forst. Prodr.* n. 464.—Small, pendulous from the faces of rocks or bank-sides. Rhizomes much branched, slender, creeping, intermatted. Stipes short, slender, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, winged almost to the base. Fronds 1–3 in. long, $\frac{1}{4}$ – $\frac{2}{3}$ in. broad, lanceolate or linear-oblong, quite glabrous, membranous, dark dull-green, irregularly 2-pinnatifid; rhachis winged throughout. Pinnæ ascending, forked or again pinnatifid. Ultimate segments linear, flat, obtuse, quite entire, a single costa in each segment, spurious venules wanting. Sori solitary, sunk in the tip of a short lateral segment and on the upper side of a pinna near its base. Indusium tubular or trumpet-shaped; mouth expanded, shortly 2-lipped. Receptacle usually exserted as a long capillary bristle.—*Hook. and Grev. Ic. Fil.* t. 35; *Hook. Sp. Fil.* i. 123; *Hook. f. Fl. Nov. Zel.* ii. 16; *Handb. N.Z. Fl.* 356; *Hook. and Bak. Syn. Fil.* 80; *Thoms. N.Z. Ferns*, 46; *Field, N.Z. Ferns*, 70, t. 5, n. 8.

NORTH ISLAND: From the North Cape southwards, not uncommon in dark woods. SOUTH ISLAND: Nelson—Happy Valley, *A. Grant*. Marlborough—Queen Charlotte Sound, *Banks* and *Solander*. Canterbury—Banks Peninsula, *Armstrong*. Sea-level to 2000 ft.

Also in Java and the Pacific islands.

4. **T. venosum**, *R. Br. Prodr.* 159.—Pendulous, usually clothing the trunks of tree-ferns. Rhizome long, slender, branched, wide-creeping, densely tomentose. Stipes $\frac{1}{2}$ –2 in. long, very slender, capillary, naked. Fronds 1–4 in. long, $\frac{3}{4}$ –1½ in. broad, linear or lanceolate to oblong, very delicate and membranous, translucent, pale-green, shining, quite glabrous, pinnate; rhachis broadly winged above, naked below. Pinnæ 4–8 pairs, very variable in shape and amount of cutting, from linear and undivided to rhomboidal-lanceolate and deeply and irregularly pinnatifid. Segments or lobes flat, obtuse, irregularly sinuate; costa flexuous, with numerous alternate once or twice dichotomous secondary veinlets. Sori generally solitary on each pinna and sunk in a short lobe on the upper margin near the base, but in specimens with broad lower pinnæ there may be 2–4 sori placed irregularly on both the upper and lower margins. Indusium tubular; mouth dilated all round, entire or very slightly 2-lipped. Receptacle usually exserted, capillary.—*A. Cunn. Precur.* n. 229; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 132; *Hook. and Grev. Ic. Fil.* t. 78; *Hook. f. Fl. Nov. Zel.* ii. 17; *Handb. N.Z. Fl.* 357; *Hook. and Bak. Syn. Fil.* 82; *Benth. Fl. Austral.* vii. 702; *Thoms. N.Z. Ferns*, 47; *Field, N.Z. Ferns*, 71, t. 14, f. 4. *T. venustulum*, *Col. in Trans. N.Z. Inst.* xii. (1880) 366.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in moist forests throughout. Sea-level to 2500 ft.

Also in south-eastern Australia and Tasmania. Mr. Colenso's *T. venustulum* is simply a small state with broader lower pinnæ sometimes bearing 2–4 sori.

5. **T. Colensoi**, *Hook. f. Ic. Plant. t.* 979.—Pendulous from rocks or from the trunks of trees. Rhizome wide-creeping, branched, capillary, more or less tomentose. Stipes short, slender, naked. Fronds rather distant, 2–5 in. long, $\frac{1}{2}$ –1 in. broad, oblong-lanceolate or linear-oblong, acuminate, quite glabrous, membranous, dark-green, 3-pinnatifid; rhachis slender, not winged. Primary pinnæ 5–12 pairs, remote, shortly stalked, pinnate at the base, pinnatifid above. Ultimate segments very narrow-linear, acute, quite entire; a central costa only in each segment. Sori solitary on the upper side of a pinna near its base and thus appearing axillary, erect, stipitate, quite free. Indusium tubular, the mouth slightly dilated. Receptacle usually exserted as a long capillary bristle.—*Fl. Nov. Zel. ii.* 17; *Handb. N.Z. Fl.* 357; *Hook. and Bak. Syn. Fil.* 85; *Thoms. N.Z. Ferns*, 47; *Field, N.Z. Ferns*, 71, t. 22, f. 3.

NORTH ISLAND: Auckland—Ravines at Mamaku, near Rotorua, *J. Stewart!* Lake Waikaremoana, *Colenso!* Taranaki—Mount Egmont Ranges, *J. M. Brame.* Wellington—Tararua Ranges, *Buchanan!* SOUTH ISLAND: Nelson—Near Collingwood, *Travers, Dall!* Takaka Valley and West Wanganui, *Kingsley.* Canterbury—Banks Peninsula, *Armstrong.* Westland—Near Okarito, *A. Hamilton!* Otago—Vicinity of Dunedin, *Buchanan!* *A. Hamilton!* Lake Wanaka, *Haast.* Sea-level to 3000 ft.

Well distinguished by the finely cut fronds with distant pinnæ and very narrow-linear acute segments. Its nearest ally is the South American *T. capillaceum*, L.

6. **T. strictum**, *Menz. ex Hook. and Grev. Ic. Fil. t.* 122.—Rhizome very short, erect or inclined, stout, woody, emitting many long wiry rootlets. Fronds numerous, crowded at the top of the rhizome. Stipes 2–4 in. long, stiff, erect, terete, naked or narrowly margined above, furnished with a tuft of red-brown bristles at the base. Fronds 3–6 in. long, $1\frac{1}{2}$ –2 $\frac{1}{2}$ in. broad, lanceolate or linear-oblong, acuminate, rigidly erect, yellowish-green, 3–4-pinnatifid; rhachis narrowly winged throughout or the wing evanescent in the lower part. Primary pinnæ close-set, lanceolate, ascending or spreading, the lower sometimes reduced in size; secondary pinnatifid. Ultimate segments narrow-linear, flat, entire, glabrous; texture firm; costa stout, unbranched. Sori usually not very numerous, terminating short segments near the base of the upper margin of the secondary pinnæ. Indusium quite free, erect, funnel-shaped, mouth dilated all round. Receptacle exserted, capillary.—*A. Rich. Fl. Nouv. Zel.* 95; *Hook. Sp. Fil. i.* 136; *Hook. f. Fl. Nov. Zel. ii.* 17; *Handb. N.Z. Fl.* 356; *Hook. and Bak. Syn. Fil.* (edit. 2) 466; *Thoms. N.Z. Ferns*, 47. *T. leptophyllum*, *A. Cunn. Precur. n.* 232; *Raoul, Choix*, 38. *T. Cunninghamii*, *Van der Bosch.* *T. rigidum* var. *strictum*, *Field, Ferns N.Z.* 72, t. 28, f. 3.

NORTH ISLAND: Damp forests from Hokianga southwards to Wellington, but far from common. SOUTH ISLAND: Nelson—Massacre Bay, *Lyall, Travers;*

Takaka and West Wanganui, *Kingsley*. Westland—Kumara, *J. M. Brame* ! Okarito, *A. Hamilton* ! Otago—Dusky Sound, *Hector* and *Buchanan*. STEWART ISLAND : *Ulva*, rare, *Kirk*. Sea-level to 3000 ft.

Confined to New Zealand, but very closely allied to the widely spread *T. rigidum*, Swartz.

7. ***T. elongatum***, *A. Cunn. Precur.* n. 231.—Rhizome short, stout, erect or inclined, clothed with the bases of the old stipites; rootlets many, rigid and wiry. Fronds 4–8 at the top of the rhizome. Stipes 3–9 in. long, stout, rigid, terete, rough below and furnished at the very base with a tuft of linear bristles, not winged above. Fronds 3–8 in. long, $1\frac{1}{2}$ –3 in. broad, ovate-deltoid, acuminate, rigid, dark olive-green, often coated on the upper surface with mosses and hepaticæ, 2–3-pinnatifid; main rhachis scarcely winged except at the very top. Primary pinnæ close, rhomboidal-lanceolate, pinnate at the base, pinnatifid above; secondary imbricating, oblong-cuneate, deeply incised or pinnatifid. Ultimate segments or lobes rather broad, usually incised at the tips, the teeth acute; veins stout, branching, one to each tooth. Sori numerous, in the axils of the lobes of the secondary pinnæ. Indusium narrow funnel-shaped, quite free; mouth scarcely dilated, entire or very slightly 2-lipped. Receptacle stout, rigid, exserted.—*Raoul, Choix*, 38; *Hook. Ic. Plant.* t. 701; *Sp. Fil.* i. 134; *Hook. f. Fl. Nov. Zel.* ii. 17; *Handb. N.Z. Fl.* 356. *T. rigidum* var. *elongatum*, *Hook. and Bak. Syn. Fil.* 86; *Thoms. N.Z. Ferns*, 48; *Field, N.Z. Ferns*, 73, t. 16, f. 2. *T. polyodon*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 618.

NORTH ISLAND: Dark woods, abundant to the north of the East Cape, from thence rare and local southwards to Cook Strait. SOUTH ISLAND: Nelson—Collingwood, *D. Grant*; Takaka and West Wanganui, *Kingsley*. Marlborough—Queen Charlotte Sound, *Banks* and *Solander*. Canterbury—Banks Peninsula, *Armstrong*. Sea-level to 2500 ft.

Closely allied to the widely distributed *T. rigidum*, Swartz, and considered to be a variety of it by Mr. Baker and other pteridologists. But the frond is broader and more deltoid, the rhizome is not creeping, and the stipes and rhachis quite wingless; the pinnæ are more imbricate and less divided, and the segments are broader and shorter. It is also found in the New Hebrides.

3. **LOXSOMA**, R. Br.

Rhizome stout, woody, creeping, paleaceous. Fronds erect, coriaceous, opaque, quite glabrous, 3–4-pinnate; stipes long. Veins free, not anastomosing. Sori marginal, in a sinus of the teeth or lobes of the frond, terminating a vein. Indusium cup-shaped or almost urceolate, coriaceous; mouth truncate, entire. Receptacle long, columnar, exserted. Sporangia numerous, mixed with jointed hairs, obovoid or pyriform, girt by a complete oblique ring, bursting vertically.

A genus of a single species, endemic in the northern portion of the colony.

1. **L. Cunninghamii**, *R. Br. ex A. Cunn. Precur.* n. 215, t. 31, 32.—Rhizome long, stout, tortuous, densely clothed with linear red-brown hairs. Stipes 1–2 ft. high, erect, pale-brown, glabrous, smooth and polished. Fronds 9–24 in. long, 6–12 in. broad, broadly triangular, coriaceous, dark-green above, glaucous-white or pale-green beneath; rhachis polished, channelled. Primary pinnæ rather distant, ascending, the upper alternate, the lowermost opposite; secondary ovate-lanceolate or lanceolate, pinnate below, pinnatifid above. Ultimate segments oblong, subacute, toothed or notched. Sori inserted in the notches, the indusium pointing backwards from the frond.—*Raoul, Choix*, 38; *Hook. Gen. Fil.* t. 15; *Sp. Fil.* i. 86; *Garden Ferns*, t. 31; *Hook. f. Fl. Nov. Zel.* ii. 18; *Handb. N.Z. Fl.* 358; *Hook. and Bak. Syn. Fil.* 56; *Thoms. N.Z. Ferns*, 33; *Field, N.Z. Ferns*, 55, t. 12, f. 1. *Trichomanes cœnop-teroides*, *Harv. ex A. Cunn. l.c.* *Davallia dealbata*, *A. Cunn. l.c.*

NORTH ISLAND: Auckland—In woods from Mongonui and Kaitaia southwards to Te Aroha, not common. Sea-level to 1200 ft.

A very remarkable fern, with the habit of a coriaceous *Davallia* or *Dicksonia*, and the sorus of a *Trichomanes*. But the sporangia differ widely from those of *Trichomanes* in having an oblique ring, and the dehiscence is vertical, like that of *Gleichenia* and *Schizæa*. It has generally been placed in the tribe *Hymenophyllaceæ*, but the recent investigations of Professor Bower (Phil. Trans. Vol. xcii., pp. 47 to 52) seem to prove that Presl and Bommer were right in regarding it as constituting a distinct tribe, having affinities with *Gleichenia* and *Schizæa* on the one hand, and on the other with the *Hymenophyllaceæ* and *Dennstædia*.

4. CYATHEA, Smith.

Tree-ferns, the New Zealand species with a trunk or caudex varying from 10–50 ft. or even more. Fronds very large, usually 2–3-pinnate, very rarely (in species not found in New Zealand) pinnate or undivided. Stipes often muricate or aculeate. Sori dorsal, globose, situated upon a vein or at the fork of a vein; receptacle elevated, globose or elongated. Indusium globose, at first covering the whole sorus, but soon bursting at the summit, often in an irregular manner, usually persistent as a cup surrounding the base of the sorus, its margin entire or laciniate. Sporangia numerous, sessile or nearly so, often mixed with jointed hairs, bursting transversely; ring somewhat oblique, usually complete.

A large and beautiful genus of over 120 species, most plentiful in damp tropical or subtropical regions, unknown in the north temperate zone. It attains its southern limit in New Zealand. Of the 4 species found therein, 2 appear to be endemic; the remaining 2 extend to Australia or the Pacific islands.

* Under-surface of frond white.

Trunk 10–30 ft. Fronds 6–12 ft.; stipes and rhachis clothed with yellowish-brown deciduous tomentum .. 1. *C. dealbata*.

** Under-surface of frond green.

- Trunk 20–50 ft. Fronds 8–20 ft., coriaceous; stipes and rhachis conspicuously muricate beneath. Fertile segments lobulate or pinnatifid 2. *C. medullaris*.
 Trunk 20–40 ft. Fronds 6–18 ft., not so coriaceous; stipes and rhachis rough but hardly muricate, clothed with yellow-brown tomentum. Fertile segments obscurely serrate, not lobulate 3. *C. Milnei*.
 Trunk 8–20 ft. Fronds 6–10 ft., almost membranous; stipes and rhachis slightly asperous, clothed with strigose hairs above. Fertile segments lobulate or pinnatifid 4. *C. Cunninghamii*.

1. *C. dealbata*, Swartz, *Syn. Fil.* 140, 356.—Trunk 10–30 ft. high, seldom more, 9–18 in. diam. at the base, clothed above the middle with the short light-brown bases of the old stipites. Fronds numerous, horizontally spreading, 6–12 ft. long, 2–4 ft. broad, 2–3-pinnate, subcoriaceous, green or yellow-green above, pure-white beneath from a coating of deciduous powder. Stipes rather slender, slightly asperous, clothed at the base with shining dark-brown linear scales, elsewhere (together with the rhachis and costæ) more or less covered with yellow-brown deciduous tomentum, becoming almost glabrous when old. Primary pinnae 1–1½ ft. long, oblong, acuminate; secondary 2–4 in., linear-lanceolate, acuminate or almost caudate, deeply pinnatifid or pinnate towards the base. Segments or pinnules ¼–½ in. long, linear-oblong, acute or subacute, more or less falcate, serrate. Sori small, globose, copious, but often confined to the lower half of the segments. Indusium small, membranous, only covering the sorus in a very early stage, persistent at the base as a shallow cup.—*A. Rich. Fl. Nouv. Zel.* 77, t. 10; *A. Cunn. Precur.* n. 226; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 27; *Hook. f. Fl. Nov. Zel.* ii. 7; *Handb. N.Z. Fl.* 349; *Hook. and Bak. Syn. Fil.* 26; *Thoms. N.Z. Ferns*, 28; *Field, N.Z. Ferns*, 45, t. 10, f. 2. *C. tricolor*, *Col. in Trans. N.Z. Inst.* xv. (1883) 304. (?) *Hemitelia falciloba*, *Col. in Trans. N.Z. Inst.* xxiv. (1892) 394. *Polypodium dealbatum*, *Forst. Prodr.* n. 454.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in woods from the North Cape to Foveaux Strait. Sea-level to 2000 ft. *Ponga*; *Silver Tree-fern*.

Perhaps the most generally distributed of the New Zealand tree-ferns. It can usually be identified at a glance by the milk-white under-surface of the fronds, although individual specimens are occasionally seen in which the under-surface is obscurely glaucous or even quite green. Very young plants are always green beneath; the white first appearing in irregular patches, giving the under-surface a curious piebald appearance. Outside New Zealand it occurs in Lord Howe Island, and a barren plant collected at Penang is assumed to be the same.

2. *C. medullaris*, Swartz, *Syn. Fil.* 140, 366.—Trunk 20–50 ft. high or even more, in old plants furnished at the base with a hard and thick conical buttress formed of densely compacted aerial root-

lets, sometimes extending for several feet up the trunk, and 1-2½ ft. diam. at the foot; trunk proper rather slender for its height, black, marked with the hexagonal scars of the old stipites, and at the very top rough with the remains of the stipites. Fronds numerous, 20-30, curving, 8-20 ft. long, 3-5 ft. broad, 2-3-pinnate, coriaceous, dark-green above, paler beneath. Stipes stout, clothed at the base with copious black linear scales, and together with the rhachis more or less covered with scattered tubercles. Primary pinnæ 1½-3 ft. long, oblong-lanceolate, acuminate; secondary 4-6 in. long, $\frac{3}{4}$ -1½ in. broad, linear-lanceolate to linear-oblong, acuminate, pinnate below, pinnatifid above, costæ more or less clothed with tawny silky hairs or glabrous. Pinnules or segments about ½ in. long, $\frac{1}{10}$ -½ in. broad, linear or linear-oblong, obtuse, falcate; the fertile ones deeply crenate-serrate or lobulate, sometimes pinnatifid; the barren ones broader, crenate-serrate or almost entire; costules usually with pale ciliated scales beneath. Sori very numerous, one to each lobe of the pinnule. Indusium brown, membranous, splitting into 2-4 irregular lobes.—*A. Rich. Fl. Nouv. Zel.* 78; *A. Cunn. Precur.* n. 227; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 26; *Hook. f. Fl. Nov. Zel.* ii. 7; *Handb. N.Z. Fl.* 349; *Hook. and Bak. Syn. Fil.* 25; *Thoms. N.Z. Ferns*, 28; *Field, N.Z. Ferns*, 42, t. 9, f. 3. *C. polyneuron*, *Col. in Trans. N.Z. Inst.* xi. (1879) 429. Polypodium medullare, *Forst. Prodr.* n. 452; *Pl. Escul.* 74.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: From the Three Kings Islands and the North Cape southwards, abundant, except in the east of Canterbury and Otago. Sea level to 2000 ft. *Korau*; *Mamaku*; *Black Tree-fern*.

Apparently the same species occurs in south-east Australia, Tasmania, and in several of the Pacific islands. Colenso's *C. polyneuron*, separated by him chiefly on account of the more numerous veinlets, hardly seems to be entitled to the rank of a variety. The mucilaginous pith of the trunk and lower part of the stipes was formerly baked and eaten by the Maoris, and was considered to be an excellent article of food.

3. *C. Milnei*, *Hook. ex Hook. f. Handb. N.Z. Fl.* 349.—Trunk tall, 20-40 ft. high, 1 ft. in diam. at the base. Fronds numerous, 6-18 ft. long, 2-4 ft. broad, 2-3-pinnate, not so coriaceous as in *C. medullaris*, dark-green above, paler beneath. Stipes stout, clothed at the base with copious linear scales, slightly asperous on the under-surface, more or less covered, as are the rhachides and costæ, with yellowish-brown deciduous wool intermixed with membranous scales. Primary pinnæ 1½-2½ ft. long, 6-10 in. wide, oblong-lanceolate, acuminate; secondary 3-5 in. long, about $\frac{3}{4}$ in. broad, linear-oblong, acuminate, deeply pinnatifid. Segments $\frac{1}{3}$ -½ in. long, oblong, obtuse, falcate, obscurely crenate-serrate, margins slightly recurved, under-surface often scaly-pubescent. Sori copious, rather large, nearer the costule than the margin.

Indusium membranous, splitting irregularly, persistent at the base of the sorus as a shallow cup with lacerate margins.—*Hook. and Bak. Syn. Fil.* 26.

KERMADEC ISLANDS: Sunday Island, abundant from sea-level to the tops of the highest hills, alt. 1700 ft.

A noble species, allied to *C. medullaris*, but sufficiently distinct in the more membranous fronds, in the stipes and rhachis not being conspicuously muricate and densely clothed on both sides with yellowish-brown deciduous wool, and in the fertile segments being much less coarsely serrate.

4. **C. Cunninghamii**, *Hook. f. in Hook. Ic. Plant.* t. 985.—Trunk 8–20 ft. high, rarely more, often coated at the base with densely compacted aerial rootlets, upper part covered with the pendent withered fronds. Fronds numerous, 20–30, 6–10 ft. long, 2–4 ft. broad, 2–3-pinnate, subcoriaceous or almost membranous, flaccid, dark-green above, paler beneath. Stipes rather slender, dark-coloured at the very base, and furnished with numerous linear scales, elsewhere pale, and together with the rhachis slightly tubercled, more or less covered, especially on the upper surface, with pale yellowish-brown woolly or strigose tomentum. Primary pinnæ 1–2 ft. long, 4–6 in. broad, oblong-lanceolate, acuminate; secondary 2–4 in. long, about $\frac{3}{4}$ in. broad, linear-oblong, acuminate, deeply pinnatifid above, pinnate below. Segments or pinnules $\frac{1}{3}$ – $\frac{1}{2}$ in. long, linear, obtuse, regularly lobulate or pinnatifid; lobules entire; veins forked. Sori copious, one to each lobe of the pinnule, rather nearer the costa than the margin. Indusium brown, membranous, at first covering the sorus, splitting up very irregularly, sometimes leaving an unequal-sided cup with lacerate edges, at other times a single lobe on one side as in *Hemitelia*.—*Fl. Nov. Zel.* ii. 7; *Handb. N.Z. Fl.* 350; *Hook. and Bak. Syn. Fil.* 25; *Thoms. N.Z. Ferns*, 29; *Field, N.Z. Ferns*, 44, t. 9, f. 1, 2.

NORTH ISLAND: Auckland—Bay of Islands, *Cunningham*, *Miss Clarke!* Whangarei, *T. F. C.*; Great Barrier Island, *Kirk*; Waitakerei and Hunua, *T. F. C.* Wellington—Hutt Valley, *Ralph*, *Buchanan*. SOUTH ISLAND: Nelson—Bateman's Gully, *D. Grant!* CHATHAM ISLANDS: *H. H. Travers!* *Miss Seddon!* Sea-level to 1500 ft.

Best distinguished from *C. medullaris*, to which it is closely allied, by the smaller size, more membranous fronds, paler and much less muricate stipes and rhachis, which are more or less clothed with yellowish strigose hairs, and by the smaller segments and sori.

5. **HEMITELIA**, R. Br.

Tree-ferns, not distinguishable in habit from *Cyathea*. Fronds large, usually 2–3-pinnate, rarely pinnate. Stipes smooth or asperous or muricate. Veins pinnately forked; veinlets free, or the lower ones more or less anastomosing just above the costa. Sori dorsal, globose, situated upon a vein or veinlet; receptacle elevated, globose or elongated. Indusium never covering the sorus,

very variable in size and shape, usually a half cup-shaped or semi-circular scale on the lower side of the sorus, sometimes small and indistinct, often deciduous. Sporangia numerous, sessile or nearly so, bursting transversely; ring somewhat oblique, complete.

A tropical or subtropical genus, containing about 45 species, 30 of which are natives of America, the remainder scattered through the warm regions of the Old World. It only differs from *Cyathea* in the small one-sided involucre, and several species might be referred to either genus. The single species found in New Zealand is endemic.

1. *H. Smithii*, *Hook. ex Hook. and Baker Syn. Fil.* 31.—Trunk 6-25 ft. high, about 9 in. diam., coated with fibrous aerial rootlets below, clothed towards the top with the pendulous withered rhachides of the old fronds. Fronds numerous, horizontally spreading, 5-9 ft. long, bipinnate, lanceolate or oblong-lanceolate, acute but hardly acuminate, thin and membranous, bright fresh-green. Stipes slender, clothed at the base with a dense brush of long shining chestnut-brown subulate-lanceolate scales, slightly asperous beneath; rhachis pale yellow-green, almost glabrous when old, when young clothed with strigillose hairs above, and with lax deciduous scales beneath. Primary pinnæ 9-15 in. long, 3-4 in. broad, linear-oblong, acuminate; costæ clothed with strigillose hairs above, paleaceous or glabrous beneath; secondary pinnæ $1\frac{1}{2}$ -2 $\frac{1}{2}$ in. long, pinnatifid above, pinnate at the base. Segments linear-oblong, acute, slightly falcate, coarsely serrate. Sori copious, on the fork of the veins. Indusium hemispherical, on the costal side of the sorus, variable in size, sometimes almost wrapping round the sorus at the base.—*Thoms. N.Z. Ferns*, 29; *Field, N.Z. Ferns*, 46, t. 9, f. 5. *Cyathea Smithii*, *Hook. f. Fl. Nov. Zel.* ii. 8, t. 72; *Handb. N.Z. Fil.* 350. *C. stellulata*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 222.

Var. *microphylla*, *Cheesem.*—Fronds fewer in number, soft, delicately membranous, pale grass-green; rhachis densely strigillose above, paleaceous beneath. Primary pinnæ rather narrower and more acuminate. Segments smaller, entire or bluntly crenulate towards the tip.—*H. microphylla*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 399.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in damp hilly forests from Kaitaia (Mongonui County) southwards. Sea-level to 2000. AUCKLAND ISLANDS: Ncrman Inlet, rare, *W. Joss ex Cockayne*!

A very beautiful species, with the most tender fronds of any New Zealand tree-fern. The trunk is not uncommonly forked or branched above; and Mr. Buchanan (*Trans. N.Z. Inst.* xix., 217) describes and figures a remarkable specimen which had no less than 16 well-developed branches. *H. Smithii* and *Dicksonia squarrosa* are plentiful through the whole of the lowland districts of Stewart Island, in S. lat. 47° 20', and the former species has recently been found in the Auckland Islands (S. lat. 50° 40'), the extreme southern limit of arborescent ferns.

6. **ALSOPHILA**, R. Br.

Usually tree-ferns, but in some species the trunk is short or absent. Fronds large, 2-3-pinnate, very similar to those of *Cyathea* or *Hemitelia*. Veins of the segments forked or pinnately divided. Sori dorsal, globose, situated upon a vein or at the fork of a vein; receptacle more or less elevated, pilose. Indusium altogether wanting. Sporangia numerous, sessile or nearly so, often mixed with hairs, bursting transversely; ring somewhat oblique, complete.

Species about 120, mostly tropical, nearly half of them from America, the remainder scattered through tropical Asia, Malaya, and the Pacific islands, with a few in Africa. The single New Zealand species is endemic.

1. **A. Colensoi**, Hook. f. *Fl. Nov. Zel.* ii. 8, t. 73.—Caudex long, prostrate and rooting, seldom more than 6-8 in. in circumference, rarely erect or ascending at the tip and attaining a height of 3-5 ft. Fronds 2-5 ft. long, $\frac{3}{4}$ -2 ft. broad, 2-3-pinnate, broadly ovate-lanceolate, acute, membranous, yellowish-green or reddish-brown. Stipes short, densely covered at the base with pale subulate scales 1 in. long, upper portion, together with the rhachis and costæ, more or less thickly clothed with fulvous or reddish-brown hairs intermixed (especially on the under-surface) with pale tumid scales. Primary pinnæ 9-15 in. long, 2-3½ in. broad, oblong-lanceolate, acuminate; secondary 1½-2 in. long, about ½ in. broad, pinnatifid above, pinnate at the base. Segments oblong, obtuse, obtusely serrate; veins simple. Sori copious, situated on the middle of the veins.—*Handb. N.Z. Fl.* 350; *Hook. and Bak. Syn. Fil.* 40; *Thoms. N.Z. Ferns*, 30; *Field, N.Z. Ferns*, 48, t. 3, f. 4.

NORTH ISLAND: Mountains of the interior, from Hikurangi and Mount Egmont southwards. SOUTH ISLAND: Not uncommon in hilly and subalpine forests throughout. STEWART ISLAND: Mount Anglem, *Kirk*! Usually between 2000 and 4000 ft., but descends to low levels in the south of Otago.

For some interesting remarks on the mode of growth of this species, see Mr. Field's "New Zealand Ferns," quoted above; also a paper by the same author in the "Journal of Botany" for 1878, p. 365.

7. **DICKSONIA**, L'Herit.

Usually tree-ferns, but in some species the caudex is short or absent. Fronds large, 2-3-pinnate. Stipes smooth or muricate. Veins pinnately forked, veinlets always free. Sori near the margin of the frond, globose, placed on the apex of a veinlet; receptacle more or less elevated. Indusium distinctly 2-valved, the upper valve continuous with the margin of the frond and usually similar to it in texture, consisting of an incurved or concave lobule; lower valve membranous or coriaceous. Sporangia numerous, sessile or nearly so, bursting transversely; ring oblique, complete.

Excluding the section *Patania* (*Dennstaedtia*, Bernh.), which seems to be more appropriately placed in the vicinity of *Davallia*, the genus contains about 25 species, widely dispersed through the tropical and subtropical regions of both hemispheres. The 3 New Zealand species are endemic, but one of them differs but slightly from the Australian *D. antarctica*, Labill.

Trunk 6–20 ft., slender, black. Stipes blackish-brown, tubercled. Sori 6–12 on each segment	1. <i>D. squarrosa</i> .
Trunk 6–20 ft., very stout, brown. Stipes short, pale-brown, smooth. Sori 3–6 to each segment	2. <i>D. fibrosa</i> .
Trunk wanting or very short. Stipes long, smooth, pale. Sori 6–12 to each segment	3. <i>D. lanata</i> .

1. *D. squarrosa*, Swartz, *Syn. Fil.* 136, 355.—Trunk 6–20 ft. high, slender, black or dark-brown, clothed above with the persistent bases of the old stipes. Fronds 4–8 ft. long, rarely more, 2–3½ ft. broad, oblong-lanceolate, 2–3-pinnate, rigid and coriaceous. Stipes slender, dark-brown or black at the base, paler above, when young clothed with long brownish-black hairs or setæ, almost glabrous when old, sides and under-surface rough with numerous small tubercles; rhachis and costæ clothed with deciduous reddish-brown wool above, rough with minute tubercles beneath. Primary pinnae 10–20 in. long, 3–5 in. broad, oblong-lanceolate, acuminate; secondary 1½–3 in. long, ¼–½ in. broad, deeply pinnatifid. Barren segments ovate or oblong, rigid, sharply toothed, the teeth almost pungent; fertile smaller and much contracted, pinnatifid. Sori copious, covering the whole under-surface of the frond, 5–12 on each segment or 1 to each lobule. Indusium rather large, both valves concave.—*A. Cunn. Precur.* n. 216; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 68; *Hook. f. Fl. Nov. Zel.* ii. 9; *Handb. N.Z. Fl.* 351; *Hook. and Bak. Syn. Fil.* 51; *Thoms. N.Z. Ferns*, 31; *Field, N.Z. Ferns*, 50, t. 10, f. 6, and t. 25, f. 6. *D. gracilis*, *Col. in Trans. N.Z. Inst.* xv. (1883) 306. *Trichomanes squarrosum*, *Forst. Prodr.* n. 476.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS.—Abundant in woods throughout. Sea-level to 2500 ft. *Weki* or *Wheki*.

Easily recognised by the slender blackish trunk, harsh and coriaceous fronds, dark-coloured stipes rough with small tubercles beneath, and rather large copious sori. The trunk is occasionally branched and sometimes produces numerous adventitious buds along its whole length, crowned with miniature fronds. A form possessing this peculiarity, and with the fronds rather narrower and more finely cut than usual, was described by Mr. Colenso as a distinct species under the name of *D. gracilis*. I cannot separate it even as a variety.

2. *D. fibrosa*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 19.—Trunk 8–20 ft. high, stout, columnar, everywhere thickly coated with matted fibrous aerial rootlets, giving it a diameter when mature of from 1–2 ft., clothed towards the top with the old pendent withered fronds. Fronds numerous, 30 or more, spreading, 4–8 ft. long, 1½–2 ft. broad, lanceolate, 2–3-pinnate, coriaceous but not so much so as in *D. squarrosa*. Stipes very short, clothed at the base with dense bright red-brown fibrillose scales; rhachis and costæ pale-

brown, smooth, densely pilose on both surfaces with soft brownish hairs. Primary pinnæ 4–10 in. long, $1\frac{1}{2}$ – $2\frac{1}{2}$ in. broad, lanceolate, acuminate or almost caudate; secondary $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, linear or linear-oblong, pinnatifid or pinnate at the very base. Segments rather close, falcate, acute; the barren ones larger and broader, almost flat, acutely coarsely toothed; fertile smaller, contracted, concave, obtusely pinnatifid. Sori very numerous, covering the whole under-surface of the frond, small, 3–6 to each segment or 1 to each lobule.—*Hook. Sp. Fil.* i. 68, t. 23B; *Hook. and Bak. Syn. Fil.* 461; *Field, N.Z. Ferns*, 51, t. 10, f. 5, and t. 25, f. 1. *D. antarctica*, *Hook. f. Fl. Nov. Zel.* ii. 10; *Handb. N.Z. Fl.* 351; *Thoms. N.Z. Ferns*, 31 (not of *Labill.*). *D. intermedia*, *Col. ex Hook. and Bak. Syn. Fil.* 461. *D. Sparrmanniana*, *Col. in Trans. N.Z. Inst.* xii. (1880) 364. *D. microcarpa*, *Col. in Trans. N.Z. Inst.* xx. (1888) 214.

NORTH AND SOUTH ISLANDS: From Tauranga and the Middle Waikato southwards, abundant in forests. CHATHAM ISLANDS: *Miss Seddon!* Sea-level to 2500 ft. *Weki-ponga; Kuripaka.*

Very close indeed to the Australian *D. antarctica*, but a much smaller plant, with densely pilose rhachides and costæ, and smaller sori. Mr. Colenso's *D. Sparrmanniana* is a short-trunked form with rather broader fertile segments; and his *D. microcarpa* has smaller and more finely cut fronds, with smaller sori; but they both merge gradually into the ordinary form. The Maoris formerly sliced the fibrous outside of the trunk into slabs, and used them in the construction of their food-houses, for the purpose of excluding rats.

3. *D. lanata*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 21.—Caudex usually long, prostrate and rooting, as thick as the wrist; more rarely short, stout, erect, and attaining a height of 3–6 ft. Fronds few, 3–6 ft. long, 1–3 ft. broad, ovate or ovate-lanceolate, acuminate, 2–3-pinnate, thick and coriaceous but hardly rigid, yellowish-green above, paler beneath. Stipes from half as long to as long as the frond, pale, smooth, clothed at the base with long purplish-brown or yellowish-brown fibrillose scales, when young more or less covered (together with the rhachis and costæ) with soft woolly deciduous hairs, almost glabrous when mature. Primary pinnæ 6–12 in. long, 2–4 in. broad, oblong-lanceolate, acuminate; secondary 1–3 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, pinnate or pinnatifid. Segments or pinnales rather closely set, slightly falcate; barren oblong or ovate, obtusely or acutely toothed or lobulate; fertile smaller and narrower, deeply pinnatifid. Sori copious, 6–12 to a segment or 1 to each lobule.—*Hook. Sp. Fil.* i. 69, t. 23c; *Hook. f. Fl. Nov. Zel.* ii. 10; *Handb. N.Z. Fl.* 351; *Hook. and Bak. Syn. Fil.* 461; *Thoms. N.Z. Ferns*, 31; *Field, N.Z. Ferns*, 53, t. 11, f. 1A, 1B, 1C. *D. lævis*, *Heward ex Hook. Sp. Fil.* i. 69.

NORTH ISLAND: Hilly forests from Mongonui to Cook Strait, not common. SOUTH ISLAND: Nelson—Massacre Bay, *Travers*; Pakawau, *Kingsley!* Westland—Okarito, *A. Hamilton!* Canterbury—Banks Peninsula, *Armstrong.* Sea-level to 2000 ft.

At Whangarei, Bay of Islands, and other northern localities this usually produces a short stout trunk, but to the south of Auckland it is invariably stemless. Possibly there may be two distinct varieties with a different geographical range, but so far I have failed to find distinctive characters to separate them.

8. DAVALLIA, Smith.

Rhizome usually long and creeping, paleaceous. Fronds large or small, usually compound, very variously divided, rarely simple, stipitate; texture coriaceous to membranous. Veins always free. Sori dorsal, but close to or at the margin of the frond, terminating a vein or veinlet, globose or more or less elongated. Indusium oblong or ovate to orbicular or broader than long, attached by a broad base under the sorus, its sides either free or adnate to the frond, open at the top. Sporangia numerous, stalked, girt by an incomplete vertical ring, bursting transversely.

A large genus of over 100 species, most abundant in the tropical and sub-tropical regions of the Old World, rare in America. The three species found in New Zealand are endemic. I have kept up the genus as defined in the "Synopsis Filicum," but the tendency of authors is to separate it into five or six or even more separate genera, mainly based on differences in the indusium. If these views are followed, *D. Tasmani* is the only one of the New Zealand species that would be retained in the restricted genus *Davallia*, *D. novæ-zealandiæ* constituting the genus *Leptolepia* of Mettenius, and *D. Forsteri* falling into *Odontosoria* of Presl.

- | | | |
|--|---------|-------------------------------|
| Fronds 4-12 in., broadly deltoid, thick and coriaceous; ultimate segments oblong, obtuse. Indusium cup-shaped, attached by the sides as well as the base | .. | 1. <i>D. Tasmani</i> . |
| Fronds about 6 in., rhomboid, subcoriaceous; ultimate segments ligulate-cuneate. Indusium pouch-shaped, attached by the sides as well as the base | .. | 2. <i>D. Forsteri</i> . |
| Fronds 12-24 in., ovate-oblong to deltoid, firm but hardly coriaceous, very finely cut; ultimate segments narrow, acute. Indusium broadly ovate, attached by the base only | .. .. . | 3. <i>D. novæ-zealandiæ</i> . |

1. *D. Tasmani*, Cheesem. in *Trans. N.Z. Inst.* xxiii. (1891) 416. —Rhizome long, stout, as thick as the finger, wide-creeping, densely clothed with chestnut-brown subulate ciliated scales. Stipes strong, rigid, smooth, 3-9 in. long. Fronds 4-12 in. long, 3-9 in. broad, broadly deltoid or pentagonal, very thick and coriaceous, quite smooth and glabrous, 2-3-pinnatifid. Lower pinnæ much the largest, broadly deltoid or rhomboidal; upper narrower, ovate or lanceolate. Pinnules oblong, cut down nearly to the base into 6-9 segments; segments short, oblong, obtuse. Sori very numerous, usually one to each segment, marginal, the segment usually produced on the outer side into a stout projecting horn. Indusium narrow cup-shaped, attached by the sides as well as the base. —Field, *N.Z. Ferns*, 75, t. 24, f. 5; Bak. in *Ann. Bot. v.* (1890-91) 201.

NORTH ISLAND : Three Kings Islands, abundant, *T. F. C.*

Very close to the northern *D. canariensis*, L., but stouter and more coriaceous, and not so finely cut.

2. *D. Forsteri*, *Carruthers in Seem. Fl. Viti*. 339. — "Stipes 6–8 in. long, naked, stramineous. Frond rhomboid, 4-pinnate, 6 in. long; pinnæ and pinnules ascending, rhomboid, stalked, the lowest the largest, cuneate-truncate on the lower side at the base; final segments ligulate-cuneate, 2–4 lines long, under $\frac{1}{2}$ line broad; texture subcoriaceous; surfaces naked; sori minute, terminal, with the lamina produced on each side as a border."—*Bak. Syn. Fil.* (edit. 2) 470; *Thoms. N.Z. Ferns*, 49; *Field, N.Z. Ferns*, 74. *Adiantum clavatum*, *Forst. Prodr.* n. 459.

SOUTH ISLAND : Dusky Bay, *Forster*.

Only known from Forster's specimens preserved in the British Museum Herbarium. Mr. Baker remarks that it is very near the New Caledonian *D. scoparia*, but the sori are smaller and bordered. In all probability it was collected by Forster in some locality in Polynesia, and accidentally mixed with his New Zealand plants.

3. *D. novæ-zealandiæ*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 22.—Rhizome long, branched, wide-creeping, as thick as a quill, clothed with yellowish-brown linear scales. Stipes 6–18 in. long, red-brown, firm, erect, rough and bristly at the base, smooth and polished above. Fronds 1–2 ft. long, 6–12 in. broad, ovate-oblong to deltoid, acuminate, firm but scarcely coriaceous, tripinnate; rhachis flexuose, channelled above, glabrous or pubescent at the axils. Primary pinnæ oblong-lanceolate, acuminate; secondary about the same shape, pinnate below, pinnatifid at the tips. Pinnules about $\frac{1}{2}$ in. long, ovate-lanceolate, deeply pinnatifid; ultimate segments or lobes very narrow, acute. Sori very numerous, placed at the tip of a short lateral veinlet on the lobes of the pinnules. Indusium broadly ovate or almost orbicular, membranous, jagged, attached to the tip of the vein under the sorus, its sides quite free.—*Hook. Sp. Fil.* i. 158, t. 51B; *Garden Ferns*, t. 51; *Hook. f. Fl. Nov. Zel.* ii. 19; *Handb. N.Z. Fl.* 358; *Hook. and Bak. Syn. Fil.* 91; *Thoms. N.Z. Ferns*, 49; *Field, N.Z. Ferns*, 74, t. 18, f. 2. *D. hispida*, *Heward MSS. ex Hook. Sp. Fil.* i. 158. *Acrophorus hispidus*, *Moore, Index. Fil.* *Leptolepia novæ-zealandiæ*, *Metten. ex Kuhn*.

NORTH AND SOUTH ISLANDS : In woods from the Bay of Islands southwards to Foveaux Strait, but often local. Sea-level to 2000 ft.

A very handsome and distinct species, with an unusually finely cut frond. It has been referred by turns to the genera (or divisions of *Davallia*) *Leucostegia*, *Microlepia*, and *Acrophorus*, and has been made the type of a new genus (*Leptolepia*) by Mettenius.

9. CYSTOPTERIS, Bernh.

Small membranous and flaccid ferns. Rhizome very short, creeping. Fronds tufted, 2-3-pinnatifid. Veins pinnate and forked; veinlets free, not anastomosing, terminating a little within the margin. Sori small, globose, dorsal, placed at a distance from the margin on the back of a vein. Indusium ovate-deltoid, membranous, jagged, free at the sides, inserted by a broad base under the sorus, and at first bent over it like a hood; ultimately reflexed. Sporangia numerous, stalked, girt by an incomplete vertical ring, bursting transversely.

A small genus of 5 species, found in cool damp mountainous situations in the temperate regions of both hemispheres. The single New Zealand species has the range of the genus.

1. *C. fragilis*, Bernh. in Schrad. *Neu. Journ. Bot.* ii. 27, t. 2, f. 9.—Rhizome short, suberect, often branched near the top, clothed with red-brown lanceolate scales. Stipes 1-4 in. long, slender, fragile, stramineous, slightly scaly at the base. Fronds 3-9 in. long, 1-2 in. broad, oblong-lanceolate or ovate-lanceolate, thin and membranous, pale-green, pinnate or 2-pinnate; rhachis smooth, naked, slightly winged above. Primary pinnæ rarely more than 1 in. long and usually much less, remote, spreading, lanceolate to ovate, toothed or pinnatifid or again pinnate; pinnules oblong, usually deeply toothed or incised. Sori 3-12 to a pinnule, medial on the veins. Indusium very delicate, at first covering the sorus, but soon reflexed and often disappearing in age.—*Hook. Sp. Fil.* i. 197; *Hook. f. Fl. Tasm.* ii. 136, t. 166; *Handb. N.Z. Fl.* 358; *Hook. and Bak. Syn. Fil.* 103; *Benth. Fl. Austral.* vii. 752; *Thoms. N.Z. Ferns*, 50; *Field, N.Z. Ferns*, 76, t. 18, f. 5, 5A. *C. tasmanica*, *Hook. Sp. Fil.* i. 199; *Id. Plant.* t. 959. *C. novæ-zealandiæ*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 360. *C. laciniatus*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 265.

NORTH ISLAND: Mount Egmont, *Mrs. Jones, T. F. C.*; Tararua Ranges, *Buchanan*; Wairarapa Valley, *H. C. Field*. SOUTH ISLAND: Not uncommon in mountain districts throughout. Usually from 1000 to 4000 ft., but descends almost to sea-level in several localities in the South Island.

Almost universally distributed in the north and south temperate zones and on the higher mountains of the tropics, and everywhere extremely variable. The usual form in New Zealand has a rather narrow frond, with short and broad sparingly divided pinnæ, and the sori are rather small. But some states are almost indistinguishable from the northern var. *dentata*. I have seen no specimens of Mr. Colenso's *C. laciniatus*.

10. LINDSAYA, Dryander.

Usually small subcoriaceous bright-green ferns. Rhizome creeping or short and tufted. Fronds pinnate or 2-3-pinnatifid; pinnæ often 1-sided. Veins free, or anastomosing in a few species not found in New Zealand. Sori forming a continuous or more

or less interrupted line within the margin of the frond and parallel to it, placed at the apex of 2 or more veins and uniting them. Indusium apparently double and 2-valved, opening outwards; upper valve formed of the more or less altered margin of the frond; lower valve thin, membranous, continuous. Sporangia numerous, stalked, bursting transversely; ring vertical, incomplete.

Understood in the sense of the "Synopsis Filicum," this is a genus of about 60 species, mainly found in the tropics of both hemispheres. Two of the New Zealand species extend to Australia and Tasmania, one of them reaching New Caledonia as well, the remaining one is endemic.

* *Eulindsaya*. Pinnæ unilateral.

Fronds linear, simply pinnate; pinnæ small, flabellate .. 1. *L. linearis*.

** *Isoloma*. Pinnæ equilateral.

Fronds 2-3-pinnatifid, dark-green, oblong-lanceolate, broadest at the base; ultimate segments obovate, rounded at the tip 2. *L. trichomanoides*.
Fronds 2-3-pinnatifid, pale-green, lanceolate, not broadest at the base; ultimate segments linear-cuneate, truncate at the tip 3. *L. viridis*.

1. *L. linearis*, Swartz, *Syn. Fil.* 118, 318, t. 3. — Rhizome slender, creeping, clothed with yellowish-brown scales. Stipes 2-9 in. long, slender, flexuous, wiry, dark red-brown, smooth and shining. Fronds 3-8 in. long, about $\frac{1}{2}$ in. broad, narrow-linear, membranous, pinnate; barren ones shorter and broader than the fertile, often prostrate; fertile always erect; rhachis naked, glossy. Pinnæ of the fertile fronds $\frac{1}{8}$ – $\frac{1}{3}$ in. long, flabellate or cuneate, sessile or nearly so, not lobed or very indistinctly so, revolute when dry. Sori forming a continuous line along the upper edge. Indusium broad, membranous; both valves minutely and irregularly lacinate. Pinnæ of the barren fronds $\frac{1}{4}$ – $\frac{1}{2}$ in. long or more, deeply lobed or incised.—*A. Rich. Fl. Nouv. Zel.* 85; *A. Cunn. Precur.* n. 213; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 206; *Hook. f. Fl. Nov. Zel.* ii. 19; *Handb. N.Z. Fl.* 359; *Hook. and Bak. Syn. Fil.* 104; *Benth. Fl. Austral.* vii. 719; *Thoms. N.Z. Ferns*, 51; *Field, N.Z. Ferns*, 77, t. 19, f. 4, 4A. *L. trilobata*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 345.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: From the North Cape southwards, usually on clay hills or in cold swampy soils, most plentiful to the north of the East Cape, rare and local in the South Island. Sea-level to 2000 ft.

Also found throughout the whole of eastern Australia and Tasmania, in Norfolk Island, and in New Caledonia. Mr. Colenso's *L. trilobata*, which appears to be the most abundant state in New Zealand, only differs in the pinnæ of the barren frond being rather more deeply lobed than usual.

2. *L. trichomanoides*, *Dryand. in Trans. Linn. Soc.* iii. (1797) 43, t. 11.—Rhizome creeping, slender, clothed with reddish-brown

scales. Stipes 3-8 in. long, rather rigid, slender, wiry, angled, polished, glabrous or slightly scaly towards the base. Fronds 3-8 in. long, $1\frac{1}{2}$ -4 in. broad, oblong-lanceolate or linear-oblong, more rarely ovate-oblong, subcoriaceous, dark-green, bipinnate. Primary pinnæ nearly opposite, 1-3 in. long, lanceolate, erectopatent, pinnatifid above, pinnate below. Pinnules or segments obovate or rounded-cuneate, entire or more or less toothed or lobed, rarely again pinnatifid. Veins obscure, flabellately branched. Sori forming a continuous intramarginal line round the apex of the lobes.—*A. Rich. Fl. Nov. Zel.* 85; *A. Cunn. Precur.* n. 214; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 218; *Hook. f. Fl. Nov. Zel.* ii. 19; *Handb. N.Z. Fl.* 359; *Hook. and Bak. Syn. Fil.* 110; *Benth. Fl. Austral.* vii. 720; *Thoms. N.Z. Ferns*, 52; *Field, N.Z. Ferns*, 78, t. 19, f. 1. *Adiantum cuneatum*, *Forst. Prodr.* n. 461.

Var. Lessonii, *Hook. f. Fl. Nov. Zel.* ii. 19.—Fronds simply pinnate or 2-pinnate at the base alone; pinnæ oblong-lanceolate, entire or lobed or pinnatifid.—*L. Lessonii*, *Bory in Duper. Voy. Coq.* 278, t. 37, f. 2; *A. Rich. Fl. Nov. Zel.* 84; *A. Cunn. Precur.* n. 212; *Raoul, Choix*, 38; *Hook. Sp. Fil.* i. 217. *L. discolor*, *Col.*

NORTH AND SOUTH ISLANDS: From Hokianga southwards to Foveaux Strait, common in the North Island, local on the eastern side of the South Island. Sea-level to 2500 ft.

Also in Australia, Tasmania, and the Fiji Islands.

3. *L. viridis*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 14.—Rhizome very short, suberect. Stipites densely tufted at the top of the rhizome, 1-4 in. long, slender, wiry, dark chestnut-brown, angled, smooth and polished, glabrous except a tuft of pale-brown scales at the base. Fronds 6-14 in. long, $1-1\frac{1}{2}$ in. broad, lanceolate, acuminate, pale-green, subcoriaceous, 2-3-pinnatifid; rhachis slender, flexuose, shining, naked. Primary pinnæ alternate, ascending, the lower ones much reduced in size, rhomboid-lanceolate; secondary obversely deltoid, simple or deeply lobed or again flabellately pinnate. Ultimate segments about $\frac{1}{2}$ in. long, cuneate or linear-cuneate, truncate. Veins simple or forked. Sori very numerous, at the tips of the segments. Indusium membranous, transversely oblong, from rather broader than long to twice as broad as long; outer valve (tip of the segment) irregularly erose.—*Bak. in Journ. Bot.* (1875) 109; *Kirk in Trans. N.Z. Inst.* x. (1878) 396; *Thoms. N.Z. Ferns*, 51; *Field, N.Z. Ferns*, 79, t. 21, f. 2. *L. trichomanoides* (in part), *Hook. Sp. Fil.* i. 218; *Hook. f. Fl. Nov. Zel.* ii. 19; *Handb. N.Z. Fl.* 359 (*not of Dryand.*). *L. microphylla*, *Hook. and Bak. Syn. Fil.* 110 (the New Zealand plant), *not of R. Br.*

NORTH ISLAND: Auckland—Great Barrier Island, *Kirk, Winkelmann*! Little Barrier Island, *Miss Shakespear*! Thames, *Adams*! Henderson's Creek, *T. F. C.*; Huia Creek, *Kirk*; near Mauku, *H. Carse*; between Tararanga and Rotorua, *Colenso*! East Cape district, *Bishop Williams*. Tara-

naki—Mount Egmont Ranges, *J. M. Brame*. Wellington—Upper Wanganui, and from thence to the base of the Tararua Range, *H. C. Field*. SOUTH ISLAND: Nelson—Massacre Bay, *Lyall*; Torrent Bay, *Kingsley*. Westland—Near Hokitika, *W. H. Tipler*. Otago—Sounds of the West Coast, *Buchanan*.

A very beautiful and distinct species, usually found on dripping rocks by waterfalls, or on the mossy banks of streams.

11. ADIANTUM, Linn.

Rhizome creeping or tufted. Stipes usually long, often black and glossy. Fronds pinnate or 2-3-pinnate, never pinnatifid, rarely simple (in a few species not found in New Zealand). Pinnules more or less dimidiate or unilateral. Veins forked or repeatedly dichotomous, frequently radiating from the petiole to the margin. Sori marginal, varying in shape from reniform or globose to oblong or linear, usually numerous and distinct, sometimes confluent and continuous. Indusium the same shape as the sorus, composed of the altered margin of the frond, which is reflexed and bears the sporangia on its under-side, opening inwards. Sporangia stalked, bursting transversely; ring vertical, incomplete.

A well-marked genus of about 80 species, found in all tropical and sub-tropical countries, but most abundant in tropical South America, a few species found in the temperate zones of both hemispheres. All the New Zealand species extend to Australia, and the majority to the Pacific islands as well, while one has a very wide distribution in warm climates generally.

A. Pinnules flabellate-cuneate, attached by the middle of the base.

Fronds 2-3-pinnate, thin and membranous, glabrous.

Pinnules small, orbicular with a cuneate base .. 1. *A. æthiopicum*.

B. Pinnules one-sided, obliquely oblong or rhomboid, attached by the lower corner of the frond.

* Sori in the deep notches between the teeth or lobules of the pinnules.

Fronds small, tender, simply pinnate or with 1-2 branches at the base. Pinnules sparsely setulose, rarely glabrous

2. *A. diaphanum*.

Fronds dichotomous, each division flabellately divided into 3-7 branches. Rhachis densely hispid 3. *A. hispidulum*.

** Sori in shallow excavations at the tips of the lobules of the pinnæ, not in the notches between the lobules.

Fronds very large and compound, 3-5 ft. high with the stipes. Rhachis pubescent above. Pinnules small, $\frac{1}{4}$ - $\frac{1}{2}$ in. Sori transversely oblong 4. *A. formosum*.

Fronds 1-2 ft. with the stipes. Rhachis smooth, polished. Pinnules $\frac{1}{2}$ -1 in., not falcate, glaucous beneath .. 5. *A. affine*.

Fronds 1-2 ft. with the stipes. Rhachis and costæ clothed with fulvous hairs. Pinnules $\frac{1}{2}$ - $\frac{3}{4}$ in., subfalcate, frequently setulose, not glaucous beneath 6. *A. fulvum*.

1. *A. æthiopicum*, Linn. *Sp. Plant.* 1560.—Rhizome creeping, stoloniferous. Stipes 4-10 in. long, very slender, dark chestnut-brown, shining, quite glabrous. Fronds 6-12 in. long, rarely more,

3-6 in. broad, oblong to oblong-ovate or oblong-deltoid, erect or drooping, pale-green, very thin and membranous, flaccid, quite glabrous, 3-4-pinnate; rhachis very slender, almost capillary, flexuous, polished. Lower pinnæ 2-4 in. long, ovate-deltoid. Pinnules on rather long and slender petioles, not dimidiate, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, often broader than long, variable in shape, usually suborbicular with a more or less cuneate base, upper margin broadly and shallowly lobed. Pinnules of barren fronds often larger, entire or obscurely lobed. Sori 2-6 to a pinnule, placed in the notches or sinuses between the lobes. Indusium rather large, reniform or transversely oblong, pale.—*Hook. Sp. Fil.* ii. 37, t. 77A; *Hook. f. Fl. Nov. Zel.* ii. 21; *Handb. N.Z. Fl.* 360; *Hook. and Bak. Syn. Fil.* 123; *Benth. Fl. Austral.* vii. 724; *Thoms. N.Z. Ferns*, 54; *Field, N.Z. Ferns*, 83, t. 17, f. 1. A. assimile, *Swartz, Syn. Fil.* 125, 322; *Raoul, Choix*, 38. A. trigonum, *Labill. Pl. Nov. Holl.* ii. 99, t. 248; *Raoul, Choix*, 38.

NORTH ISLAND: Plentiful in lowland districts from the North Cape to the Thames and Waikato Rivers, from thence rare and local to Hawke's Bay (*Colenso!*) and Taranaki (*H. C. Field!*). SOUTH ISLAND: Has been reported from Nelson and Canterbury, but I have seen no specimens.

An abundant fern in most tropical and subtropical countries.

2. **A. diaphanum**, *Blume, Enum. Fil. Jav.* 215.—Rhizome very short, tufted; rootlets long, fibrous, densely tomentose, bearing numerous small oblong tubers. Stipes 2-6 in. long, very slender, almost capillary, wiry, glabrous or slightly scaly towards the base, dark purplish-brown or almost black. Fronds 3-6 in. long, rarely more, simply pinnate, or with 1-2 branches at the base which are sometimes almost as long as the central portion but usually much shorter, thin and membranous, flaccid, dark-green; branches $\frac{1}{2}$ -1 in. diam. Pinnules numerous, shortly petiolate, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, about $\frac{1}{4}$ in. deep, dimidiate-oblong; lower margin straight or more or less decurved, entire; upper margin about parallel, and together with the rounded apex deeply crenate-toothed; surfaces sparingly setulose with minute stiff black hairs. Sori 4-8 to a pinnule, rarely more, placed in the notches of the upper and outer margins. Indusium reniform, pale, minutely setulose.—*Hook. Sp. Fil.* ii. 10, t. 80c; *Hook. and Bak. Syn. Fil.* 117; *Thoms. N.Z. Ferns*, 53; *Field, N.Z. Ferns*, 80, t. 13, f. 5. A. affine, *Hook. Sp. Fil.* ii. 32; *Hook. f. Fl. Nov. Zel.* ii. 20; *Handb. N.Z. Fl.* 360 (not of Willd.). A. setulosum, *J. Sm. in. Bot. Mag. Comp.* (1846) 22.

Var. **polymorphum**, *Cheesem.*—Fronds smaller, pale-green, usually simply pinnate, rarely branched at the base. Surfaces of the pinnæ and indusia quite glabrous.—A. polymorphum, *Col. in Trans. N.Z. Inst.* xx. (1888) 215. A. tuberosum, *Col. l.c.* 217.

KERMADEC ISLANDS, NORTH ISLAND: Not uncommon in woods at low elevations, usually in rich alluvial soils. SOUTH ISLAND: Apparently rare and 31—Fl.

local. Nelson—Bateman's Gully, *D. Grant*; Collingwood, *H. H. Travers*. Canterbury—Gorge of the Rakaia, *Potts*. Otago—Various localities, *Buchanan, Kirk*. Sea-level to 1000 ft.

Also in Norfolk Island, east Australia, Fiji, New Caledonia, New Hebrides, Java, and southern China.

3. **A. hispidulum**, *Swartz, Syn. Fil.* 124, 321.—Rhizome short, stout, creeping. Stipes 6–15 in. long, stout, erect, scabrous, dark-brown or almost black, more or less clothed with short greyish-white pubescence when young, becoming almost glabrous when old. Fronds broad, 6–12 in. or more across, dichotomously forked at the base, both forks irregularly flabellately divided into 3–7 linear secondary divisions 3–8 in. long by $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, colour olive-green, often red or reddish-brown when young, rhachises densely hispid-pubescent. Pinnules numerous, closely placed, petiolate, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, about $\frac{1}{4}$ in. deep, dimidiate, rhomboidal, rigid, prominently nerved, more or less hispid, especially on the under-surface, upper margin and the obtuse tip finely toothed, lower margin entire. Sori numerous on each pinnule, contiguous, placed in the notches of the upper and outer margins. Indusium orbicular-reniform, minutely hispid.—*A. Rich. Fl. Nouv. Zel.* 88; *A. Cunn. Precur.* n. 209; *Raoul, Choix*, 38; *Hook. Sp. Fil.* ii. 31; *Hook. f. Fl. Nov. Zel.* ii. 20; *Handb. N.Z. Fl.* 360; *Hook. and Bak. Syn. Fil.* 126; *Benth. Fl. Austral.* vii. 725; *Thoms. N.Z. Ferns*, 55; *Field, N.Z. Ferns*, 82, t. 13, f. 1. *A. pubescens*, *Schkuhr Fil.* 108, t. 116; *A. Rich. Fl. Nouv. Zel.* 89. *A. pedatum*, *Forst. Prod.* 458 (not of *Linn.*).

KERMADEC ISLANDS, NORTH ISLAND: Abundant as far south as the East Cape and Raglan, from thence somewhat rare and local to Cook Strait. SOUTH ISLAND: Nelson—Bishopdale, *D. Grant*.

The rather harsh hispid-pubescent fronds distinguish this from all the other New Zealand species. Outside New Zealand, it extends through the Pacific islands and Australia to tropical Asia and Africa.

4. **A. formosum**, *R. Br. Prodr.* 155.—Rhizome long, stout, creeping, scaly. Stipes 1–3 ft. high, dark purplish-black or quite black, shining, sometimes hairy towards the base, scabrous throughout. Fronds $1\frac{1}{2}$ –3 ft. long, 12–20 in. broad, broadly deltoid, dark-green, copiously 3–4-pinnate; main rhachis flexuous, black, glossy, glabrous or pubescent; secondary rhachises usually pubescent. Lower pinnæ large and broad, often 12–15 in. long, ascending, very compound; secondary pinnæ usually again divided. Pinnules very numerous; fertile small, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, $\frac{1}{5}$ – $\frac{1}{4}$ in. deep, petiolate, dimidiate, broadly obliquely-oblong or rhomboid; lower margin straight or slightly hollowed, entire, upper and the rounded outer margin deeply toothed or incised; texture firm; under-surface glabrous or pubescent with scattered white hairs. Pinnules of the barren frond larger, often

$\frac{3}{4}$ in. long or more, more membranous, upper and outer margins deeply lobulate, the lobules incised. Sori numerous, placed in shallow depressions at the top of the teeth or lobules, broader than long, transversely oblong or oblong-reniform.—*Hook. Sp. Fil.* ii. 51, t. 86B; *Hook. f. Fl. Nov. Zel.* ii. 21; *Handb. N.Z. Fl.* 360; *Hook. and Bak. Syn. Fil.* 119; *Benth. Fl. Austral.* vii. 724; *Thoms. N.Z. Ferns*, 54; *Field, N.Z. Ferns*, 81, t. 6.

NORTH ISLAND: Auckland—Alluvial banks of the northern Wairoa River, from Tangiteroria to a few miles above Dargaville, *T. F. C.* Wellington—Manawatu River and its tributaries, from Woodville to below Palmerston North, *Colenso! Enys! Field! Hamilton! &c.*

Also a native of eastern Australia. Easily recognised by its large size, decompound fronds, and numerous small somewhat rigid pinnules.

5. **A. affine**, *Willd. Sp. Plant.* v. 448.—Rhizome long, creeping, stout, clothed with glossy dark chestnut-brown scales. Stipes 4–12 in. long or more, stout, erect, shining-black, rough and scaly at the very base, smooth and polished above. Fronds 6–15 in. long. 3–9 in. broad, ovate-deltoid in outline, bipinnate or tripinnate at the base, pale-green above, usually glaucous beneath, quite glabrous or the secondary rhachises pubescent above. Pinnæ 2–3 pairs with a long terminal one sometimes 6–9 in. long, in large specimens the lowest pair again branched. Pinnules $\frac{1}{2}$ –1 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. deep, petiolate, dimidiate, broadly obliquely-oblong or rhomboidal; lower margin straight, entire, base truncate; upper margin and the obtusely rounded apex deeply crenate-toothed; texture firm, subcoriaceous. Sori numerous, rather large, 6–14 to a pinnule, placed in small notches at the tips of the lobes of the upper and outer margins, not in the sinuses between the lobes. Indusium orbicular-cordate or reniform.—*Hook. and Bak. Syn. Fil.* 117; *Benth. Fl. Austral.* vii. 724; *Thoms. N.Z. Ferns*, 53; *Field, N.Z. Ferns*, 80, t. 6, f. 1. *A. Cunninghamii*, *Hook. Sp. Fil.* ii. 52, t. 86A; *Hook. f. Fl. Nov. Zel.* ii. 21; *Handb. N.Z. Fl.* 360. *A. formosum*, *A. Rich. Fl. Nouv. Zel.* 88; *A. Cunn. Precur.* n. 208; *Raoul, Choix*, 38 (not of *R. Br.*). *A. pullum*, *Col. in Trans. N.Z. Inst.* xxv. (1873) 319.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in lowland districts throughout.

Also in Australia, according to *Bentham* (*Fl. Austral.* vii. 724). Very variable in size, the amount of branching of the frond, and in the size and shape of the pinnules. When growing on exposed rock-faces it is often dwarfed to an inch or two. Most of the Chatham Islands specimens that I have seen are less compound, with larger and coarser narrower pinnules, corresponding, I presume, with the variety *Chathamicum* of *Mr. Field* (*N.Z. Ferns*, 81). A curious form gathered by *Mr. Hamilton* on limestone crags at Moteo, near Puketapu, Hawke's Bay, has the tips of the pinnæ largely cristate, and the pinnules very irregular in shape. It is the *A. Cunninghamii* var. *heterophyllum* of *Colenso* (*Trans. N.Z. Inst.* xx. (1888) 218). States with the secondary rhachises somewhat pubescent above, and with rather narrower and more acute pinnules, seem to show a marked approach to *A. fulvum*.

6. **A. fulvum**, *Raoul, Choix de Plantes*, 9.—Rhizome long, creeping, clothed with brownish subulate scales. Stipes 4–12 in. long, erect, dark reddish-brown or almost black, rough with minute projections throughout, more or less scaly towards the base. Fronds 6–15 in. long, 3–9 in. broad, ovate-deltoid in outline, 2–3-pinnate or rarely in large specimens 4-pinnate at the base, olive-green or pale-green, not glaucous beneath; rhachis and costæ more or less densely clothed above with strigose fulvous hairs. Pinnæ 2–4 pairs with a long terminal one, in small specimens not branched, in larger ones the lowest pair and sometimes all again divided, or rarely the lowest pair twice branched. Pinnules $\frac{1}{2}$ – $\frac{3}{4}$ in. long, about $\frac{1}{4}$ in. deep, petiolate, dimidiate, obliquely oblong, often slightly falcate; lower margin curved or nearly straight, entire; upper margin almost parallel, deeply crenate; lower surface often minutely setulose with stiff fulvous hairs; texture firm but not coriaceous. Sori usually numerous in shallow notches at the tips of the lobes of the upper and outer margins, not in the sinuses between the lobes. Indusium orbicular-cordate, often pale when young.—*Hook. Sp. Fil.* ii. 52, t. 85A; *Hook. f. Fl. Nov. Zel.* ii. 22; *Handb. N.Z. Fl.* 361; *Hook. and Bak. Syn. Fil.* 120; *Thoms. N.Z. Ferns*, 54; *Field, N.Z. Ferns*, 81, t. 6, f. 4. *A. viridescens*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 400.

NORTH AND SOUTH ISLANDS: Lowland districts as far south as Banks Peninsula, not uncommon.

Very close indeed to *A. affine*, with which it certainly seems to me to be connected by intermediate forms. It is more copiously branched, the rhachis and costæ are clothed with strigose fulvous hairs, the stipes is minutely muricate, and the pinnules are narrower and subfalcate, and often setulose beneath. It is also found in Norfolk Island, New South Wales, and Fiji.

12. **HYPOLEPIS**, Bernh.

Rhizome usually wide-creeping. Fronds large, 2–3-pinnate or decompound, often glandular or tomentose; texture membranous or herbaceous. Veins forked, free, never anastomosing. Sori small, globose, distinct, placed in the sinuses of the ultimate divisions of the frond. Indusium orbicular or reniform, membranous, composed of the modified margin of the frond, reflexed over the sorus and more or less covering it. Sporangia stalked, bursting transversely, with an incomplete vertical ring.

Species 12, confined to the tropics and the south temperate zone. Of the three species found in New Zealand, two are endemic, the remaining one extends to Australia, Polynesia, and the Malay Archipelago. The genus only differs from *Polypodium* (as defined in the "Synopsis Filicum") by the sori being partly covered by an incurved lobule of the frond.

Fronds (with the stipes) 2–5 ft., deltoid, tomentose,
4-pinnate. Pinnules crenate-toothed 1. *H. tenuifolia*.

- Fronds (with the stipes) 9-24 in., deltoid, almost glabrous,
3-pinnate, pale-green. Pinnules deeply and sharply
toothed 2. *H. millefolium*.
Fronds (with the stipes) 6-20 in., lanceolate, almost gla-
brous, 2-pinnate, brownish-green. Pinnules deeply
toothed 3. *H. distans*.

1. *H. tenuifolia*, Bernh. in Schrad. Neu. Journ. Bot. ii. 34.—Rhizome long, stout, creeping, densely clothed with red-brown linear scales. Stipes 1-2 ft. high or more, strong, erect, brown or yellow-brown, slightly rough with minute points, naked or pubescent, usually scaly towards the base. Fronds 1-3 ft. long, $\frac{1}{2}$ -2 ft. broad, ovate-oblong to broadly deltoid, pale-green, membranous or subcoriaceous, 4-pinnatifid; primary and secondary rhachises more or less tomentose with crisped hairs, rarely glabrous. Primary pinnæ 8-20 in. long, 4-10 in. broad, ovate or ovate-lanceolate, acuminate; secondary and tertiary lanceolate or oblong-lanceolate. Ultimate divisions linear-oblong, obtuse or acute, crenate-toothed; costa and sometimes the under-surface more or less pubescent. Sori numerous, rounded, placed in the sinuses between the teeth or lobes. Indusium composed of the reflexed scale-like tip of a lobule of the frond, sometimes covering the sorus when young, often very inconspicuous when old.—Hook. Sp. Fil. ii. 60, t. 89c and 90A; Hook. f. Fl. Nov. Zel. ii. 22; Handb. N.Z. Fl. 361; Hook. and Bak. Syn. Fil. 129; Benth. Fl. Austral. vii. 726; Thoms. N.Z. Ferns, 56; Field, N.Z. Ferns, 84, t. 24, f. 3, and t. 27, f. 4; H. dicksonioides, Hook. Sp. Fil. ii. 61. Cheilanthes ambigua, A. Rich. Fl. Nouv. Zel. 84; A. Cunn. Precur. n. 211; Raoul, Choix, 38. C. arborescens, Swartz, Syn. Fil. 129, t. 336. C. pelucida, Col. in Tasmanian Journ. Nat. Sci. (1845) 13. Lonchites tenuifolia, Forst. Prodr. n. 424.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 2000 ft.

Also in Norfolk Island, Australia, the Pacific islands, and Java. A most variable fern; in habit and general appearance often so close to *Polypodium punctatum* that the suspicion naturally arises that the two species may be forms of one plant, a view which is rendered more probable by the fact that the indusium is sometimes so feebly developed that the technical distinction separating *Hypolepis* and *Polypodium* is obliterated. Usually, however, *Polypodium punctatum* can be distinguished by the sori being further from the margin and by the glandular-viscid rhachis and costæ. Mr. Colenso's *Cheilanthes pelucida*, which is kept as a distinct variety in the "Species Filicum" (t. 90A), looks different at first sight on account of its stouter habit, broader and more obtuse pinnules, and more copious crisped hairs, but is connected with the type by numerous intermediates.

2. *H. millefolium*, Hook. Sp. Fil. ii. 68, t. 95B.—Rhizome long, slender, creeping, naked or nearly so. Stipes 3-9 in. long, rigid, erect, yellow-brown, glossy, smooth or slightly scabrous, glabrous or sparingly pilose with crisped hairs. Fronds 6-18 in. long,

3-9 in. broad, broadly ovate or deltoid to ovate-lanceolate, pale-green when fresh, firm or almost rigid, 4-pinnatifid; rhachis and costæ more or less clothed with scattered crisped hairs. Primary and secondary pinnæ ovate-lanceolate, ascending; tertiary $\frac{1}{5}$ - $\frac{1}{3}$ in. long, ovate or oblong, cut down almost to the rhachis into several entire or sharply-toothed lobes; under-surface glabrous or slightly hairy. Sori numerous, small, roundish, placed under a small lobule in the sinuses of the pinnules. Indusium composed of the reflexed and almost unaltered tip of the lobule.—*Hook. f. Fl. Nov. Zel.* ii. 23; *Handb. N.Z. Fl.* 361; *Hook. and Bak. Syn. Fil.* 130; *Thoms. N.Z. Ferns*, 56; *Field, N.Z. Ferns*, 85, t. 3, f. 2.

NORTH ISLAND: East Cape district, *Bishop Williams*; base of Ruapehu, *H. C. Field*! Mount Egmont, *Buchanan*, *H. C. Field*, *T. F. C.*; Ruahine Mountains, *Colenso*! *Field*; Manawatu Gorge, *A. Hamilton*; Tararua Mountains, *W. Townson*. SOUTH ISLAND: Not uncommon in mountain districts throughout. CAMPBELL ISLAND, ANTIPODES ISLAND, *Kirk*. Usually from 1500 to 4000 ft., but descends almost to sea-level in the south of Otago.

Well distinguished from any of the forms of *H. tenuifolia* by the finely and deeply cut pinnules.

3. *H. distans*, *Hook. Sp. Fil.* ii. 70, t. 95c.—Rhizome long, rigid, branched, clothed with red-brown linear scales. Stipes 3-9 in. long, slender, flexuous, fragile, red-brown, glossy, naked, minutely muricate. Fronds 6-15 in. long, 3-6 in. broad, ovate-lanceolate, acuminate, rigid, brownish-green or reddish-brown, 2-pinnate; rhachis slender, red-brown, glabrous or nearly so, scabrous like the stipes. Primary pinnæ 2-3 in. long, about $\frac{1}{2}$ in. broad, opposite or nearly so, distant, spreading at right angles, lanceolate; secondary (pinnules) $\frac{1}{4}$ in. long, sessile, lanceolate, rigid, deeply pinnatifid. Ultimate segments ovate, spreading, toothed or incised. Sori 2-8 to a pinnule, placed in the lower sinuses. Indusium composed of the inflexed tip of a lobule, small, membranous.—*Hook. f. Fl. Nov. Zel.* ii. 23; *Handb. N.Z. Fl.* 362; *Hook. and Bak. Syn. Fil.* 129; *Thoms. N.Z. Ferns*, 56; *Field, N.Z. Ferns*, 85, t. 28, f. 6.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: From the North Cape to the south of Otago, not common, usually at low elevations.

Small and slender forms of *Polypodium punctatum* are easily mistaken for this; but in its usual state it is a smaller and more slender plant, with more distant pinnæ, and the frond is never densely hairy or viscid-pubescent. It is confined to New Zealand.

13. CHEILANTHES, Swartz.

Rhizome short and tufted, or long and creeping. Fronds usually small, erect, 2-3-pinnate; texture subcoriaceous. Veins free, forked, not anastomosing. Sori marginal, terminating the veins, small, rounded or oblong, at first distinct, afterwards more or less confluent. Indusium roundish or oblong, consisting of a more

or less modified tooth or lobule of the frond, reflexed over the sorus and in the young state more or less concealing it. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

A genus of about 60 species, found in most tropical and temperate regions. It is only separated from *Nothochlæna* by the modified tooth or lobule of the frond reflexed over the sorus, a character which is sometimes so obscure that it is difficult to separate the two genera. The two New Zealand species are both widely distributed.

Fronds broad, deltoid ..	..	..	..	..	1. <i>C. tenuifolia</i> .
Fronds linear-oblong or linear ..	..	..	..	..	2. <i>C. Sieberi</i> .

1. *C. tenuifolia*, Swartz, *Syn. Fil.* 129, 332.—Rhizome very short, suberect, clothed with silky scales. Stipes 3–9 in. long, tufted, wiry, erect, dark red-brown, smooth and polished, glabrous or slightly scaly when young. Fronds 4–10 in. long, 2–4 in. broad, deltoid or ovate-deltoid, submembranous, yellowish-green, 3-pinnatifid; rhachis smooth, polished, glabrous or nearly so. Primary pinnæ 6–12 on each side, opposite or nearly so, ascending or spreading; the lowest pair sometimes $2\frac{1}{2}$ in. long, deltoid; the upper smaller and narrower. Pinnules oblong or elliptic-oblong, deeply pinnatifid; ultimate segments entire or irregularly lobed or crenate; surfaces glabrous. Sori on the margins of the lobes, generally confluent and continuous all round the edge of the pinnules. Indusium narrow, elongated, usually crenate or denticulated, often transversely wrinkled.—*Hook. Sp. Fil.* ii. 82, t. 87c; *Hook. and Bak. Syn. Fil.* 138; *Benth. Fl. Austral.* vii. 726; *Kirk in Trans. N.Z. Inst.* vi. (1874) 248; *Thoms. N.Z. Ferns*, 57; *Field, N.Z. Ferns*, 86, t. 21, f. 2, 3. *C. Kirkii*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 360 (not of *Hook.*). *C. venosa*, *Col. in Trans. N.Z. Inst.* xxv. (1893) 321. *Pteris alpina*, *Field, N.Z. Ferns*, 97, t. 28, f. 2.

NORTH ISLAND: Auckland — Mount Maunganui, near Tauranga, *Mrs. Hetley*! Hawke's Bay—Mohaka, *E. Craig*! Petane, *A. Hamilton*! in various localities, *Colenso*! Wellington—Near Wanganui, *H. C. Field*. SOUTH ISLAND: Canterbury — Banks Peninsula, *Lyall*, *Armstrong*, *Kirk*! Otago—Mountains near Lake Wakatipu, *Buchanan*; Lake Wanaka, *Mrs. Mason*! Sea-level to 2500 ft.

Extends northwards through Australia to the Malay Archipelago, India, and China. The typical state is easily distinguished from the following species by the broad deltoid frond, but intermediates are occasionally seen.

2. *C. Sieberi*, *Kunze in Pl. Preiss.* ii. 112.—Rhizome short, stout, creeping, clothed with chestnut-brown scales. Stipes 3–9 in. long, densely tufted, erect, wiry, dark chestnut-brown, polished, glabrous or with a few fibrillose scales. Fronds 3–9 in. long, $\frac{3}{4}$ – $1\frac{1}{2}$ in. broad, linear-oblong or linear, erect, rigid, glabrous, 2–3-pinnatifid; rhachis smooth, glossy. Primary pinnæ 3–15 opposite pairs, ascending, the lower rather remote, $\frac{1}{2}$ –1 in. long, ovate-deltoid. Pinnules oblong, deeply pinnatifid; segments entire or

cuneate, margins much recurved when dry. Sori roundish or oblong, distinct, or ultimately confluent and continuous round the margins of the pinnules. Indusium usually elongated, narrow; margins pale, entire or minutely denticulate.—*Hook. Sp. Fil.* ii. 83, t. 97B; *Hook. and Bak. Syn. Fil.* 137; *Thoms. N.Z. Ferns*, 58; *Field, N.Z. Ferns*, 87, t. 21, f. 1. *C. tenuifolia*, *A. Rich. Fl. Nouv. Zel.* 83; *A. Cunn. Precur.* n. 210; *Raoul, Choix*, 38; *Hook. f. Fl. Nov. Zel.* ii. 23 (*for the greater part, not of Swartz*). *C. tenuifolia* var. *Sieberi*, *Hook. f. Handb. N.Z. Fl.* 362. *C. erecta*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 619.

NORTH AND SOUTH ISLANDS: From the North Cape southwards, not uncommon in dry rocky places.

Abundant in Australia, and also found in New Caledonia and the Isle of Pines.

14. *PELLÆA*, Link.

Rhizome usually creeping. Fronds tufted, or scattered along the rhizome, simply pinnate in the New Zealand species, 2–3-pinnate and often palmate or pedate in others; texture subcoriaceous or membranous; veins always free but often obscure. Sori marginal, in an early stage distinct and oblong or linear-oblong, decurrent along the tips of the veins, but soon becoming confluent and forming a continuous broad or narrow marginal band. Indusium formed of the modified edge of the frond, continuous, often very narrow, at first involute over the sori, ultimately spreading, often hidden by the ripe sporangia. Sporangia stalked, with an incomplete vertical ring, bursting transversely.

About 60 species are known, found in the temperate and tropical regions of both hemispheres. One of the two New Zealand species extends as far north as India, the other is said to occur in Australia.

Erect. Pinnæ $\frac{3}{4}$ –2 in. long, lanceolate to linear-oblong .. 1. *P. falcata*.
Often decumbent. Pinnæ $\frac{1}{3}$ – $\frac{3}{4}$ in. long, oblong to orbicular 2. *P. rotundifolia*.

1. *P. falcata*, *Fée Gen. Fil.* 129.—Rhizome stout, creeping, scaly. Stipes 3–6 in. long, strong, erect, dark red-brown or almost black, more or less hispid with spreading scales. Fronds 12–18 in. long or more, $1\frac{1}{2}$ –3 in. broad, linear or linear-oblong, simply pinnate; rhachis densely scaly and bristly. Pinnæ 15–40 on a side, quite entire, alternate, shortly petiolate or the upper sessile, $\frac{3}{4}$ –2 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, lanceolate or oblong-lanceolate to linear-oblong, often slightly falcate, acute or mucronate, truncate or cuneate at the base, the lower ones slightly auriculate on the upper margin near the base; texture coriaceous; both surfaces glabrous or nearly so; veins not visible. Sori usually forming a broad continuous marginal band all round the pinnæ. Indusium very narrow, membranous, continuous.—*Hook. Sp. Fil.* ii. 135, t. 111B; *Hook. f. Handb. N.Z. Fl.* 363; *Hook. and Bak. Syn.*

Fil. 151; *Thoms. N.Z. Ferns*, 58; *Field, N.Z. Ferns*, 88, t. 18, f. 4. *Pteris falcata*, *R. Br. Prodr.* 154; *Hook. f. Fl. Nov. Zel.* ii. 24; *Benth. Fl. Austral.* vii. 729. *P. seticaulis*, *Hook. Ic. Plant.* t. 207. *Platyloma falcatum*, *J. Sm.*

KERMADEC ISLANDS: MacGillivray, *T. F. C.* NORTH ISLAND: Auckland—In various localities from Whangaroa to the Waikato River, but rare and local. SOUTH ISLAND: Nelson—Dun Mountain, *Potts*; near Nelson, *D. Grant*; Graham River, *T. F. C.*

Extends to Australia and Tasmania, the Malay Archipelago, and India. All the New Zealand specimens that I have seen have shorter and broader pinnæ than the typical state, and approach *P. rotundifolia* so closely as to make it probable that the two species are forms of one plant.

2. *P. rotundifolia*, *Hook. Sp. Fil.* ii. 136.—Habit of *P. falcata*, but smaller and more slender, and fronds often decumbent. Rhizome long, rigid, wiry, creeping, clothed with appressed scales. Stipes 3–6 in. long, dark red-brown, densely pubescent and scaly. Fronds 6–14 in. long, $\frac{3}{4}$ –1½ in. broad, linear, simply pinnate; rhachis bristly and scaly throughout. Pinnæ 10–30 on each side, alternate, petiolate or the upper sessile, quite entire, $\frac{1}{3}$ –¾ in. long, $\frac{1}{4}$ –½ in. broad, variable in shape, oblong or oblong-ovate to orbicular, obtuse or mucronate at the tip, rounded or obliquely truncate at the base, glabrous or nearly so, coriaceous; veins concealed. Sori forming broad marginal lines on both the upper and lower edges of the pinnæ, but not so continuous as in *P. falcata*. Indusia very numerous, membranous, involute when young, but soon reflexed and often concealed by the sporangia.—*Fil. Exot.* t. 48; *Hook. f. Handb. N.Z. Fl.* 363; *Hook. and Bak. Syn. Fil.* 151; *Thoms. N.Z. Ferns*, 59; *Field, N.Z. Ferns*, 89, t. 14, f. 2. *Pteris rotundifolia*, *Forst. Prodr.* n. 420; *A. Rich. Fl. Nouv. Zel.* 78; *A. Cunn. Precur.* n. 198; *Raoul, Choix*, 38; *Hook. Ic. Plant.* 422; *Benth. Fl. Austral.* vii. 730. *Allosurus rotundifolius*, *Kunze in Linnæa*, xxviii. 219. *Platyloma rotundifolium*, *J. Sm.*

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: From the North Cape to Foveaux Strait, not uncommon in dry woods. Sea-level to 2000 ft.

Also in Norfolk Island; and Bentham refers a Queensland plant to the same species.

15. PTERIS, Linn.

Rhizome usually creeping. Fronds of very various habit, generally compound, often of large size. Veins free or more or less anastomosing. Sori marginal, linear, continuous, placed on a slender connecting-vein (receptacle) running along the edge of the frond and joining the tips of the transverse veinlets. Indusium long, narrow, continuous, composed of the more or less modified and membranous margin of the frond, at first involute over the sori, at length usually spreading and exposing the sporangia. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

Understood in the wide sense of the "Synopsis Filicum," this is a large genus of 125 species or more, almost cosmopolitan in its distribution. Two of the New Zealand species are endemic, two extend to Australia and the Pacific islands, the remaining two are very widely spread indeed.

A. Veins free.

- | | |
|--|--------------------------|
| Fronds 2-8 ft. or more, deltoid, rigid, coriaceous. Segments $\frac{1}{2}$ -1 in. long, decurrent at the base | 1. <i>P. aquilina</i> . |
| Fronds 9-18 in., ovate or ovate-lanceolate, rigid, coriaceous, glandular pubescent. Segments small, $\frac{1}{10}$ - $\frac{1}{4}$ in. long, acute | 2. <i>P. scaberula</i> . |
| Fronds 1-3 ft., ovate or deltoid, membranous, glabrous. Segments $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, obtuse | 3. <i>P. tremula</i> . |

B. Veins anastomosing.

- | | |
|---|---------------------------|
| Fronds 2-4 ft., deltoid, dark-green, 2-pinnate or rarely 3-pinnate. Segments of the pinnules lanceolate or linear-lanceolate, 1-3 in. long, entire or toothed at the tips | 4. <i>P. comans</i> . |
| Fronds 1-3 ft., deltoid, pale-green, 2-4-pinnate. Pinnules often remote, stalked, ovate or deltoid, deeply lobed .. | 5. <i>P. macilentia</i> . |
| Fronds 2-4 ft., ovate-deltoid to ovate-lanceolate, glaucous, 2-3-pinnate. Pinnæ distant, sessile; pinnules oblong, obtuse, usually entire | 6. <i>P. incisa</i> . |

P. lomarioides, Col. in Trans. N.Z. Inst. xiii. (1880) 380, said to have been collected near Tapuae-haruru, Taupo, is proved by the type specimen in Mr. Colenso's herbarium to be the widely distributed *P. cretica*, Linn. Although it is just possible that the species may exist near some of the hot springs at Taupo, where other tropical ferns, such as *Gleichenia dichotoma*, *Nephrodium unitum* and *N. molle* are known to grow, still, as the locality has been repeatedly searched without success, the most prudent course is to wait for further evidence before introducing the species into the Flora. The same course must be followed with respect to *P. longifolia*, Linn., an equally widely spread plant, stated by Mr. Buchanan (Trans. N.Z. Inst. xiv. (1882) 356) to have been gathered at Tarawera, between Napier and Taupo, but of which there are no indigenous specimens in any New Zealand herbarium.

1. *P. aquilina*, Linn. *Sp. Plant.* 1533; *var. esculenta*, Hook. *f. Fl. Nov. Zel.* ii. 25.—Rhizome stout, as thick as the finger, creeping, much branched, often matted, subterranean, producing numerous scattered fronds. Stipes variable in length, stout, rigid, erect, brown, smooth and shining. Fronds usually from 2-6 ft. long including the stipes, but often taller and sometimes 10-12 ft., broadly deltoid in outline, coriaceous, glabrous or nearly so when mature, usually more or less rusty-pubescent when young, especially on the under-surface, 3-4-pinnate; rhachises grooved above, usually pubescent. Primary pinnæ broad, distant, spreading, the lowest pair the largest and most compound, the upper ones gradually decreasing in size; secondary and tertiary lanceolate, always terminating in a linear obtuse undivided segment. Ultimate segments linear or linear-oblong, decurrent at the base. Veins free, once or twice forked. Sori usually continuous all round the segment, and often extending to the decurrent base. Indusium double, but the

inner one often very inconspicuous.—*Hook. Sp. Fil.* ii. 196, t. 141; *Hook. f. Handb. N.Z. Fl.* 363; *Hook. and Bak. Syn. Fil.* 162; *Benth. Fl. Austral.* vii. 731; *Thoms. N.Z. Ferns*, 60; *Field, N.Z. Ferns*, 92, t. 14, f. 1, 1A. *P. esculenta*, *Forst. Prodr.* n. 418; *Pl. Escul.* 74; *A. Rich. Fl. Nouv. Zel.* 79; *A. Cunn. Precur.* n. 200; *Raoul, Choix*, 38. *Pteridium aquilinum*, *Kuhn*.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Abundant throughout, except in dense forest, often covering extensive areas, especially in the North Island. *Common fern; Bracken; Rau-aruhe; Rahurahu*; of the root *Aruhe*, *Roi*. Sea-level to 4000 ft.

P. aquilina, in some of its forms, is almost cosmopolitan; the variety *esculenta*, which chiefly differs in the decurrent bases of the pinnules, is confined to the Southern Hemisphere. The starchy rhizome formerly constituted one of the chief vegetable foods of the Maoris. For an account of the mode of its preparation, and many interesting particulars concerning its use, reference should be made to Mr. Colenso's paper "On the Vegetable Food of the Ancient New-Zealanders" (*Trans. N.Z. Inst.* xiii., pp. 1-38.)

2. *P. scaberula*, *A. Rich. Fl. Nouv. Zel.* 82, t. 11.—Rhizome wide-creeping, rigid, wiry, clothed with chestnut-brown scales. Stipes 4-12 in. long, rigid, erect, yellow-brown or chestnut-brown, scabrous, glandular-pubescent and usually more or less bristly. Fronds 9-18 in. high, rarely more, 4-9 in. broad, ovate or ovate-lanceolate, acuminate, rigid, coriaceous, pale yellow-green, usually copiously glandular-pubescent on both surfaces, rarely almost glabrate; rhachis scabrous, flexuous. Primary pinnæ numerous, the lowest pair often distant, lanceolate or ovate-lanceolate, 3-9 in. long; secondary lanceolate. Ultimate divisions small, $\frac{1}{10}$ - $\frac{1}{4}$ in. long, stipitate, acute, entire or the barren ones toothed or incised, often lobed or pinnatifid at the base; veins obscure. Sori copious, when mature usually covering the whole segment except the costa and the extreme tip and base.—*A. Cunn. Precur.* n. 204; *Raoul, Choix*, 38; *Hook. Sp. Fil.* 174, t. 93A; *Hook. f. Fl. Nov. Zel.* ii. 25; *Handb. N.Z. Fl.* 364; *Hook. and Bak. Syn. Fil.* 163; *Thoms. N.Z. Ferns*, 61; *Field, N.Z. Ferns*, 94, t. 19, f. 5. *P. microphylla*, *A. Cunn. Precur.* n. 206; *Raoul, Choix*, 38. *Allosurus scaberulus*, *Presl*. *Poesia scaberula*, *Kuhn*.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, usually on bank-sides, or in dry open places in woods. Sea-level to 2500 ft.

Easily distinguished from the other species of the genus in New Zealand by the finely divided frond and minute coriaceous pinnules. In the North Island it quickly takes possession of the sides of road-cuttings in forest districts, often to the exclusion of other vegetation.

3. *P. tremula*, *R. Br. Prodr.* 154.—Rhizome short, stout, sub-erect, putting up numerous tufted erect fronds. Stipes 1-2 ft. long, stout, erect, quite glabrous, smooth and polished, bright chestnut-

brown, darker at the base. Fronds 1-3 ft. long or more, 6-24 in. broad, ovate or ovate-deltoid, acuminate, bright-green, herbaceous, quite glabrous, 2-4-pinnate; rhachis smooth, naked. Primary pinnæ 6-12 pairs, subopposite; the lowest 6-15 in. long, ovate-lanceolate or ovate-deltoid, usually bipinnate, sometimes tripinnate; upper gradually becoming shorter and narrower and less compound; the uppermost linear, pinnate or pinnatifid. Ultimate segments $\frac{1}{2}$ - $1\frac{1}{2}$ in. long, $\frac{1}{10}$ - $\frac{1}{6}$ in. broad, linear or linear-oblong, obtuse, sessile and decurrent at the base; fertile usually entire or slightly crenate at the tips; barren generally broader and with the margins crenate throughout; veins free, forked. Sori copious, usually continuous on both the upper and lower edges of the segments, rarely interrupted.—*Hook. Sp. Fil.* ii. 174, t. 120B; *Hook. Fl. Nov. Zel.* ii. 25; *Handb. N.Z. Fl.* 364; *Hook. and Bak. Syn. Fil.* 161; *Benth. Fl. Austral.* vii. 731; *Thoms. N.Z. Ferns*, 60; *Field, N.Z. Ferns*, 90, t. 23, f. 2. *P. affinis*, *A. Rich. Fl. Nouv. Zel.* 81; *A. Cunn. Precur.* n. 201; *Raoul, Choix*, 38. *P. tenuis*, *A. Cunn. Precur.* n. 205. *P. Kingiana*, *Endl. Prodr. Fl. Insl. Norfolk.* 13.

KERMADEC ISLANDS, NORTH ISLAND: Abundant, ascending to 2500 ft. SOUTH ISLAND: In various localities in Nelson and Marlborough, but not common; recorded from Banks Peninsula by Armstrong.

Also in Australia and Tasmania, Norfolk Island, Lord Howe Island, and Fiji. Very variable in the size and shape of the ultimate segments. *P. Kingiana* (var. *Kingiana*, *Hook. and Bak. Syn. Fil.* 161) sometimes has them over $1\frac{1}{2}$ in. long and more than $\frac{1}{4}$ in. broad; while in *P. tenuis*, *A. Cunn.*, they are very narrow, the sori occupying the whole under-surface except the costa.

4. *P. comans*, *Forst. Prodr.* n. 419.—Rhizome short, stout, suberect. Stipes 1-2 ft. long or more, erect, yellow-brown, polished, naked or clothed at the base with dark-brown scales. Fronds 1-4 ft. long, $\frac{1}{2}$ -3 ft. broad, broadly deltoid, acuminate, membranous, dark-green, quite glabrous, 2-pinnate or rarely 3-pinnate at the base; rhachis smooth, polished. Lower pinnæ in large specimens nearly 2 ft. long by 1 ft. broad and bipinnate, but usually from 9-18 in. and pinnate, shortly stalked; upper pinnæ gradually becoming shorter and narrower, oblong-lanceolate or lanceolate, regularly pinnatifid; terminal pinna 6-9 in. long, cut down almost to the rhachis. Ultimate segments variable in size and shape, 1-3 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, lanceolate or linear-lanceolate to linear-oblong, acute or obtuse, straight or falcate, the fertile ones serrate at the tips or sinuate-serrate or sinuate-lobed, sinus between the segments acute. Veins anastomosing copiously. Sori continuous, but not reaching the apex of the segments.—*A. Rich. Fl. Nouv. Zel.* 79; *A. Cunn. Precur.* n. 199; *Raoul, Choix*, 38; *Hook. Sp. Fil.* ii. 219; *Hook. f. Fl. Nov. Zel.* ii. 26; *Hook. and Bak. Syn. Fil.* 171; *Benth. Fl. Austral.* vii. 733; *Thoms. N.Z. Ferns*, 62; *Field, N.Z. Ferns*, 95, t. 24, f. 1. *P. Endlicheriana*, *Aghard Sp. Pterid.* 66; *Hook. Ic. Plant.* t. 973; *Sp. Fil.* ii. 218; *Hook. f. Handb. N.Z. Fl.* 364. *Litobrochia comans*, *Presl. Tent. Pteridogr.* 66.

KERMADEC ISLANDS: Most abundant, *McGillivray, T. F. C.* NORTH ISLAND: From the Three Kings Islands and the North Cape southwards to the Bay of Plenty, usually in shaded places near the sea, plentiful on the outlying islands, rare and local on the mainland.

This is often confounded by fern-collectors with large states of *P. macilenta* var. *pendula*, but is an altogether different plant, with a coarser and stouter habit of growth, much-broader less-divided fronds, and usually long and narrow segments, with the venation more copiously anastomosing. It is also found in Australia, Tasmania, and the Pacific islands.

5. *P. macilenta*, *A. Rich. Fl. Nouv. Zel.* 82, t. 11.—Rhizome very short, suberect, clothed with the bases of the old stipites. Stipes 6–12 in. long, pale yellow-brown, becoming darker towards the base, smooth or slightly scaly below. Fronds 1–3 ft. long, 9–18 in. broad, broadly ovate or deltoid, membranous, flaccid, pale-green and glistening, quite glabrous, 2–3-pinnate; rhachis smooth, stramineous. Primary pinnæ numerous, distant, the lower ones 6–12 in. long, the upper gradually shorter; terminal pinna 1–3 in. long, acuminate, deeply pinnatifid. Secondary pinnæ stalked, those on the lower branches again pinnate, on the upper pinnatifid. Pinnules 1–2 in. long, scattered, often remote, stalked, ovate or deltoid, cuneate at the base, pinnatifid, the terminal ones adnate and decurrent. Ultimate segments oblong or ovate, deeply and coarsely toothed or incised at the apex. Veins anastomosing along the costa, free elsewhere. Sori in the notches between the segments, short, not nearly reaching the tips of the segments.—*A. Cunn. Precur.* n. 202; *Raoul, Choix*, 38; *Hook. Sp. Fil.* ii. 219; *Hook. f. Fl. Nov. Zel.* ii. 26; *Handb. N.Z. Fl.* 364; *Hook. and Bak. Syn. Fil.* 171; *Thoms. N.Z. Ferns*, 61; *Field, N.Z. Ferns*, 94, t. 7, f. 1. *Litobrochia macilenta*, *Brack. Fil. U.S. Expl. Exped.* 106.

Var. *pendula*.—Not so finely divided. Terminal pinna larger, 3–5 in. long, often caudate. Pinnules larger, 2–2½ in. long, ovate, acuminate; segments longer and narrower.—*P. pendula*, *Col. in Trans. N.Z. Inst.* xx. (1888) 218.

NORTH ISLAND: Not uncommon throughout in dry woods. SOUTH ISLAND: Nelson—Near Nelson, *T. F. C.*; Takaka, *Kingsley*. Marlborough—*Buchanan*. Also said to occur on Banks Peninsula and near Greymouth, but I have seen no specimens.

6. *P. incisa*, *Thunb. Fl. Cap.* 733.—Rhizome long, creeping, rather slender, smooth, producing numerous scattered fronds. Stipes 1–3 ft. high or more, stout, erect, smooth and glossy, yellow-brown or red-brown when mature, often glaucous when young, naked or slightly scabrous at the base. Fronds variable in size, 2–4 ft. long, broadly deltoid or ovate-deltoid to ovate-lanceolate, membranous when young, firm in age, quite smooth and glabrous, glaucous-green, 2–3-pinnate; rhachis pale chestnut-brown, smooth and polished. Primary pinnæ large, 6–12 in. long or more, ovate-lanceolate, opposite or nearly so, rather distant, sessile, the opposite pairs often almost connate at the base, 2-pinnatifid or the uppermost

simply pinnate. Secondary pinnæ lanceolate, deeply pinnatifid, sometimes pinnate at the base. Ultimate segments oblong or oblong-deltoid, obtuse, those of the barren fronds often sinuate-dentate or lobed. Veins sometimes all free, but usually more or less anastomosing near the costa of the pinnules. Sori continuous or interrupted, seldom reaching either the base or apex of the segment.—*Hook. Sp. Fil.* ii. 230; *Hook. f. Handb. N.Z. Fl.* 364; *Hook. and Bak. Syn. Fil.* 172; *Benth. Fl. Austral.* vii. 732; *Thoms. N.Z. Ferns*, 62; *Field, N.Z. Ferns*, 96, t. 8, f. 4. *P. vespertilionis*, *Lab. Pl. Nov. Holl.* ii. 96, t. 245; *Hook. f. Fl. Antarct.* i. 110; *Fl. Nov. Zel.* ii. 26. *P. Brunoniana*, *Endl. Prodr. Fl. Insl. Norfolk.* 12; *A. Cunn. Precur.* n. 203; *Raoul, Choix*, 38. *P. montana*, *Col. in Tasmanian Journ. Nat. Sc.* (1845) 12. *Litobrochia incisa* and *L. vespertilionis*, *Presl. Tent. Pteridogr.* 149. *Histiopteris incisa*, *Aghard Sp. Pteridogr.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant throughout, often forming thickets on the skirts of woods, &c. Sea-level to 3000 ft.

Universally spread through the tropics and the south temperate zone. In New Zealand it attains exceptional luxuriance by the margins of hot springs in the Rotorua and Taupo districts, in some localities reaching a height of 12 ft.

16. LOMARIA, Willd.

Rhizome creeping or short and suberect, sometimes lengthened into a short caudex, rarely long and climbing. Fronds variable in size, usually simply pinnate or pinnatifid, rarely undivided, very rarely bipinnate, dimorphic; the outer fronds sterile with large and broad flat pinnæ, the inner fertile with smaller linear pinnæ. Veins free, not anastomosing. Sori linear, in a continuous elongated line occupying the whole space between the midrib and the margin. Indusium linear, membranous, composed of the more or less modified edge of the frond, at first revolute over the sorus, ultimately spreading. Sporangia stalked, girt by an incomplete vertical ring, bursting transversely.

A large genus of nearly 50 species, most abundant in the south temperate zone, but with outlying species in most temperate and tropical countries. It only differs from *Blechnum* in the sori being close to the margin of the frond, and is united with that genus by many pteridologists. Of the 14 species found in New Zealand 4 or perhaps 5 are endemic, 2 are widely distributed in the south temperate zone, the remainder are found either in Australia or the Pacific islands, or in both.

A. Fronds pinnate or pinnatifid, rarely simple.

* Sterile fronds pinnatifid (or rarely simple), central and lower pinnæ connected by their dilated bases.

- | | |
|--|--------------------------|
| Fronds 1-3 ft. long, often pendulous, broad, coriaceous, sometimes simple. Pinnæ few, large, 4-12 in. long, 1-1½ in. broad | 1. <i>L. Patersoni</i> . |
| Fronds 1-4 ft. high, narrow, erect. Pinnæ very numerous, 1-3 in. × ¼-½ in., reddish or dirty-white beneath | 2. <i>L. discolor</i> . |

** Sterile fronds pinnatifid above, pinnate below, central and lower pinnæ free, but more or less dilated at their bases.

a. Pinnæ at the base of the frond not reduced in size.

Fronds 4-14 in., lanceolate-deltoid. Pinnæ 1-3 in., lanceolate or ensiform, the lowest pair often deflexed .. 3. *L. vulcanica*.

b. Pinnæ gradually reduced in size towards the base of the frond.

Fronds 1-3 ft. × 3-6 in., submembranous. Pinnæ $1\frac{1}{2}$ -3 in. × $\frac{1}{2}$ - $\frac{3}{4}$ in., lanceolate, falcate, acuminate. Pinnæ of fertile fronds 2-3 in. long. .. 4. *L. Norfolkiana*.

Fronds 6-18 in. × 2-4 in., submembranous. Pinnæ 1-2 in. × $\frac{1}{4}$ - $\frac{1}{2}$ in., oblong-lanceolate, obtuse or acute, sinuate-crenate. Pinnæ of fertile fronds $\frac{3}{4}$ -1 $\frac{1}{2}$ in., narrow-linear, acute .. 5. *L. lanceolata*.

Fronds 9-30 in. × $1\frac{1}{2}$ -4 in., fleshy or coriaceous. Pinnæ $\frac{3}{4}$ -2 $\frac{1}{2}$ in. × $\frac{1}{4}$ - $\frac{1}{2}$ in., linear-oblong to lanceolate, entire. Pinnæ of fertile fronds $\frac{3}{4}$ -1 $\frac{1}{2}$ in., linear-oblong, obtuse .. 6. *L. dura*.

Rhizome short. Fronds 4-12 in. × $\frac{1}{2}$ -1 in., dark-green, coriaceous. Pinnæ $\frac{1}{2}$ - $\frac{3}{4}$ in. × $\frac{1}{4}$ in., oblong to suborbicular. Fertile fronds shorter than the sterile .. 7. *L. Banksii*.

Rhizome creeping. Fronds 2-12 in. × $\frac{1}{2}$ - $\frac{3}{4}$ in., coriaceous to submembranous. Pinnæ $\frac{1}{2}$ - $\frac{3}{4}$ in., ovate-oblong to linear-oblong. Fertile fronds longer than the sterile; pinnæ linear-oblong, obtuse .. 8. *L. alpina*.

*** Sterile fronds pinnate, or pinnatifid above; pinnæ not dilated at their

Rhizome short, thick. Fronds often very large, 1-8 ft. long. Pinnæ 3-12 in. × $\frac{1}{2}$ -1 in., linear, coriaceous .. 9. *L. capensis*.

Rhizome very long, climbing. Sterile fronds dimorphic; lower with small rounded pinnæ; upper with long lanceolate falcate ones .. 10. *L. filiformis*.

Rhizome short, suberect. Fronds 3-8 in. × 1-1 $\frac{1}{2}$ in., blackish-green, lyrate-pinnatifid. Terminal pinnæ much longer than the lateral .. 11. *L. nigra*.

Rhizome stout, suberect. Fronds 12-30 in. × $\frac{3}{4}$ -1 $\frac{1}{2}$ in., linear, membranous; rhachis and stipes bristly and scaly. Pinnæ $\frac{1}{2}$ - $\frac{3}{4}$ in. × $\frac{1}{4}$ - $\frac{1}{2}$ in., oblong to suborbicular, obtuse .. 12. *L. fluviatilis*.

Rhizome short, suberect. Fronds 3-10 in. × $\frac{3}{4}$ -1 $\frac{1}{2}$ in., submembranous; stipes and rhachis naked. Pinnæ $\frac{1}{2}$ - $\frac{3}{4}$ in., ovate-oblong to oblong, obtuse .. 13. *L. membranacea*.

B. Fronds bipinnate.

Rhizome often produced into a caudex resembling the trunk of a miniature tree-fern. Fronds 9-18 in. long, ovate, acuminate .. 14. *L. Fraseri*.

1. *L. Patersoni*, Spreng. *Syst. Veg.* iv. 62; var. *elongata*, Hook. and Bak. *Syn. Fil.* 174.—Rhizome short, stout, creeping, clothed with blackish-brown scales, sometimes stoloniferous; rootlets tomentose. Stipes 3-9 in. long, stout, black, scaly at the base. Sterile fronds very variable; of young plants (and occasionally of old ones) quite simple and entire, 6-12 in. long, 1-1 $\frac{1}{2}$ in. broad; of old plants pinnatifid, 1-3 ft. long or more, 6-12 in. broad, broadly

ovate to ovate-lanceolate, erect or pendulous, coriaceous, glabrous, dark-green above, paler beneath; rhachis winged throughout. Pinnæ 4-12 on each side, alternate, acuminate, broadly decurrent at the base, forming a rounded lobe in the sinus, quite entire; at the base of the frond there are usually several small rudimentary pinnæ sometimes extending down the stipes almost to its base. Veins numerous, close, free, forked. Fertile fronds as long as the sterile, pinnatifid; pinnæ narrow-linear, 4-10 in. long, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad. Sori continuous, ultimately covering the whole under-surface except the costa.—*Thoms. N.Z. Ferns*, 64; *Field, N.Z. Ferns*, 98, t. 11, f. 3, 3A, 3B. *L. elongata*, *Blume, En. Fil. Jav.* ii. 201; *Hook. Sp. Fil.* iv. 3, t. 143; *Hook. f. Fl. Nov. Zel.* ii. 29; *Handb. N.Z. Fl.* 367. *L. heterophylla*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 15 (not of *Desv.*). *L. Colensoi*, *Hook. f. Ic. Plant.* t. 627, 628. *Blechnum Patersoni*, *Metten.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Damp hilly forests from the Thames and Te Aroha southwards, not common; local on the east side of the South Island. Sea-level to 3000 ft.

The New Zealand variety is also found in the Pacific islands, Malaya, and India. The typical state, which differs in the fronds being usually simple, occurs in Australia, Tasmania, and the Philippines. As in most of the species of the genus, the fronds are sometimes partly fertile and partly sterile.

2. *L. discolor*, *Willd. Sp. Plant.* v. 293.—Rhizome short, stout, suberect, stoloniferous at the base, often lengthened above into a short erect caudex 1-2 ft. high, clothed at the top with the bases of the old stipites. Stipes 3-6 in. long, stout, polished, densely covered at the base with dark-brown linear scales. Fronds numerous, tufted at the top of the caudex and forming an elegant crown, erect, 1-4 ft. high; sterile linear-lanceolate to oblong-lanceolate, gradually tapering at both ends, 2-6 in. broad in the middle, coriaceous, glossy-green above, dirty-white to reddish-brown beneath, often clothed with rufous scales when young, glabrous when old, deeply pinnatifid or pinnate at the very base. Pinnæ very numerous, closely placed, horizontally spreading, 1-3 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, linear to linear-oblong, subacute, usually connected by their broad dilated bases, margins minutely sinuate. Veins close, free, forked. Fertile fronds about as long as the sterile but narrower; pinnæ $\frac{3}{4}$ -1 $\frac{1}{2}$ in. long, linear, stout, often flexuous, usually with broad leafy bases. Sori continuous, covering the whole under-surface except the costa. Indusium with the margins much lacerated.—*A. Cunn. Precur.* n. 181; *Raoul, Choix*, 37; *Hook. Sp. Fil.* iii. 5; *Hook. f. Fl. Nov. Zel.* ii. 30; *Handb. N.Z. Fl.* 368; *Hook. and Bak. Syn. Fil.* 175; *Benth. Fl. Austral.* vii. 735; *Thoms. N.Z. Ferns*, 65; *Field, N.Z. Ferns*, 100, t. 4, f. 2, 2A. *Stegania discolor*, *A. Rich. Fl. Nouv. Zel.* 87. *Onoclea discolor*, *Swartz, Syn. Fil.* iii. *Osmunda discolor*, *Forst. Prodr.* n. 413. *Blechnum discolor*, *Metten.*

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Abundant in open forests throughout. Sea-level to 3000 ft.

Easily distinguished by the tall erect habit, long and narrow horizontally spreading pinnæ, and dirty-white or reddish under-surface. The fronds are frequently forked at the top, and a beautiful sport is in cultivation in which the pinnæ are greatly expanded in the upper two-thirds of their length, and deeply pinnatifid. Also a native of Norfolk Island, Australia, and Tasmania.

3. *L. vulcanica*, Blume, *En. Fil. Jav.* ii. 202.—Rhizome short, stout, woody, erect or inclined, densely clothed with the remains of the old stipites. Stipes 4–9 in. long, slender, pale yellow-brown, clothed towards the base with dark-brown shining subulate scales, smooth and polished above. Sterile fronds 4–14 in. long without the stipes, 2–5 in. broad at the base, lanceolate-deltoid, not narrowed below, acuminate, coriaceous, dull-green, glabrous or the surfaces and margins sprinkled with soft white hairs, pinnate at the base, pinnatifid above. Pinnæ 1–3 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, spreading, lanceolate or ensiform, broadest at the base, acute or obtuse at the tip, falcate, lowest pair deflexed; margins thickened, entire or minutely crenate-undulate. Veins free, forked. Fertile fronds usually exceeding the sterile and with a longer stipes, pinnate in the lower half; pinnæ 1–2 in. long, linear, distant, with a dilated adnate base. Sori continuous; indusium with lacerate margins.—*Hook. Ic. Plant.* t. 969; *Sp. Fil.* iii. 12; *Hook. f. Fl. Nov. Zel.* ii. 29; *Handb. N.Z. Fl.* 367; *Hook. and Bak. Syn. Fil.* 176; *Benth. Fl. Austral.* vii. 735; *Thoms. N.Z. Ferns*, 65; *Field, N.Z. Ferns*, 99, t. 27, f. 5, 5A. *L. deltoides*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 17. *L. deflexa*, *Col. l.c.* 18. *L. paucijuga*, *Col. in Trans. N.Z. Inst.* xx. (1888) 222. *Blechnum vulcanicum*, *Christ.*

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In dry open woods from Auckland and Coromandel southwards, but often rare and local, especially to the north of the East Cape, more frequent in the subalpine forests of Nelson and Canterbury. Sea-level to 3500 ft.

A well-marked species, at once recognised by the narrow-deltoid frond, with the lowest pair of pinnæ deflexed. It extends northwards through Australia and the Pacific islands to Malaya.

4. *L. Norfolkiana*, Heward in *Lond. Journ. Bot.* (1842) 122.—Rhizome short, stout, erect or inclined, clothed with the bases of the old stipites mixed with dark-brown chaffy scales. Stipes short, stout, 2–4 in. long, scaly at the base. Sterile fronds numerous, forming a crown at the top of the rhizome, erect or spreading, 1–3 ft. high, 3–6 in. broad, lanceolate or narrow elliptic-lanceolate, gradually tapering from the middle to both ends, acuminate, dark-green, firm but scarcely coriaceous, quite glabrous, deeply pinnatifid or pinnate at the base. Pinnæ numerous, close-set, horizontally spreading, $1\frac{1}{2}$ –3 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, lanceolate, tapering from a broad adnate base to an acuminate point, subfalcate, the lower ones

gradually reduced in size to minute auricles, margins crenulate; veins fine, close, forked. Fertile fronds rather shorter than the sterile, pinnate; pinnæ remote, very narrow-linear, 2-3 in. long, apiculate.—*Bak. in Ann. Bot.* v. (1891) 219. *L. acuminata*, *Bak. Syn. Fil.* (edit. 2) 481; *Thoms. N.Z. Ferns*, 66. *L. attenuata*, *Hook. f. Handb. N.Z. Fl.* 368; *Field, N.Z. Ferns*, 101 (not of *Willd.*).

KERMADEC ISLANDS: Sunday Island, abundant, *McGillivray, T. F. C.*

NORTH ISLAND: Three Kings Islands, *T. F. C.* Little Barrier Island, *Reischek! T. F. C.*

Also in Norfolk Island. It can only be distinguished from *L. lanceolata* by the greater size, the long acuminate sterile pinnæ, and the much longer fertile pinnæ, and might well be regarded as a variety only. On both the Three Kings Islands and the Little Barrier it appears to gradually merge into the ordinary state of *L. lanceolata*.

5. *L. lanceolata*, *Spreng. Syst. Veg.* iv. 62.—Rhizome short, stout, erect or inclined, rarely produced into a short caudex 3-6 in. high. Stipes 2-6 in. long, firm, erect, dark-brown at the base and clothed with subulate scales, paler and glabrous above. Fronds tufted, forming a crown at the top of the rhizome; the sterile ones 6-18 in. long, 2-4 in. broad, lanceolate, acuminate, gradually narrowed to the base, rather membranous, pale-green or dark-green, quite glabrous, pinnate below, pinnatifid above. Pinnæ numerous, close-set, horizontally spreading or ascending, 1-2 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, lanceolate or oblong-lanceolate, attached by a broad somewhat dilated base, gradually tapering to an obtuse or acute point, slightly falcate, usually sinuate-crenate towards the tip, rarely entire; veins conspicuous, free, forked. Fertile fronds usually shorter than the sterile, 1-2 in. broad, pinnate; pinnæ $\frac{3}{4}$ -1 $\frac{1}{2}$ in. long, distant, narrow-linear, acute or apiculate.—*A. Cunn. Precur.* n. 180; *Raoul, Choix*, 37; *Hook. Ic. Plant.* t. 429; *Sp. Fil.* iii. 11; *Hook. f. Fl. Nov. Zel.* ii. 29; *Handb. N.Z. Fl.* 367; *Hook. and Bak. Syn. Fil.* 177; *Benth. Fl. Austral.* vii. 735; *Thoms. N.Z. Ferns*, 66; *Field, N.Z. Ferns*, 102, t. 11, f. 2, 2A. *L. aggregata*, *Col. in Trans. N.Z. Inst.* xx. (1888) 223; *Field, N.Z. Ferns*, 103, t. 29, f. 7, 7A. *Blechnum lanceolatum*, *Sturm.*

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND: From the North Cape southwards, abundant by the margins of streams, &c. Sea-level to 2500 ft.

Also in Victoria, Tasmania, South Australia, and the Pacific islands. A variable plant. Large specimens pass into *L. Norfolkiana*, and smaller ones are sometimes difficult to separate from *L. membranacea*.

6. *L. dura*, *Moore in Gard. Chron.* (1866) 290.—Rhizome stout, erect, clothed with the bases of the old stipes, sometimes lengthened into a short caudex. Stipes 1-2 in. long, clothed at the base with large ovate-lanceolate brownish scales. Fronds

numerous, tufted, forming a crown at the top of the rhizome; sterile 1-2½ ft. long, 1½-4 in. broad, lanceolate, acute or acuminate, usually broadest above the middle, very gradually narrowed to the base, dark-green, fleshy or almost coriaceous, pinnatifid above, pinnate below. Pinnæ numerous, close-set, often overlapping, the largest ¾-2½ in. long, ¼-½ in. broad, variable in shape, linear-oblong to lanceolate, obtuse or acute, often falcate, attached by a broad base, the upper narrower and more acute, lowermost dwarfed to rounded auricles; margins entire, slightly thickened. Veins free, forked. Fertile fronds shorter and narrower than the sterile, 1-2½ in. broad; pinnæ numerous, close, linear-oblong, rigid, obtuse. Sori very copious, covering the whole under-surface—*Hook. f. Handb. N.Z. Fl.* 748; *Hook. and Bak. Syn. Fil.* 177; *Thoms. N.Z. Ferns*, 66; *Field, N.Z. Ferns*, 104, t. 10, f. 4, 4A. *L. rigida*, *J. Sm. Ferns, Brit. and For.* 290.

SOUTH ISLAND: Banks Peninsula, *Armstrong*. Eastern and southern coasts of Otago, not uncommon, *Petrie! Thomson, Kirk!* West Coast sounds, *J. D. Enys!* STEWART ISLAND AND THE SNARES: *Kirk!* CHATHAM ISLANDS: Abundant, *Chudleigh! Buchanan!* *Miss Seddon!* AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: *Kirk!*

A purely littoral plant, never found far from the influence of sea-spray. Easily recognised by the fleshy or coriaceous habit, the usually obtuse and entire sterile pinnæ, and by the close-set broad and rigid fertile pinnæ.

7. **L. Banksii**, *Hook. f. Fl. Nov. Zel.* ii. 31, t. 76.—Rhizome short, stout, woody, erect or inclined, clothed with the old stipites at the top, and with matted fibres below. Stipes short, stout, dark-coloured, furnished at the base with numerous ovate-lanceolate chaffy scales. Fronds numerous; sterile 4-12 in. high, rarely more, ½-1 in. broad, linear-lanceolate, narrowed to both ends, rather coriaceous, dark-green, sometimes with a glaucous tinge, pinnatifid above, pinnate below. Pinnæ numerous, close-set, adnate by a broad base, ⅓-½ in. long, rarely more, about ¼ in. broad, broadly oblong or almost semi-orbicular, obtuse, quite entire; lower pinnæ much reduced, sometimes forming a sinuated wing down to the base of the stipes. Fertile fronds usually shorter than the sterile, pinnate throughout; pinnæ shorter and narrower, more distant, straight or curved. Sori copious, covering the whole under-surface.—*Handb. N.Z. Fl.* 368; *Hook. Sp. Fil.* iii. 17; *Hook. and Bak. Syn. Fil.* 178; *Thoms. N.Z. Ferns*, 67; *Field, N.Z. Ferns*, 105, t. 26, f. 2, 2A. *Blechnum Banksii*, *Mettenius*.

NORTH ISLAND: Auckland—North Cape, *Buchanan*; near Ahipara, *T. F. C.*; Bay of Islands, *A. Cunningham*; Little Barrier Island, *Kirk!* *T. F. C.*; Manukau Heads, *Sinclair, Colonel Haultain!* East Cape, *Colenso!* Taranaki—White Cliffs to Cape Egmont, *Buchanan, T. F. C.* Wellington—Wellington Heads, *Field*; Cape Terawiti, *Kirk!* SOUTH ISLAND: Marlborough—Queen Charlotte Sound, *Banks and Solander*. Nelson—Cape Farewell, *Kirk!* West Wanganui, *Kingsley*. Canterbury—Banks Peninsula,

Armstrong. Otago—Not uncommon on both the East and West Coasts, *Buchanan*, *Petrie*! *Thomson*, *Hamilton*! STEWART ISLAND: *Paterson's Inlet*, *Kirk*.

A well-marked plant, easily recognised by the coriaceous habit and short and broad rounded pinnæ attached by a broad base. Like *L. dura*, it is a purely littoral plant, never found beyond the influence of the sea-spray.

8. *L. alpina*, *Spreng. Syst. Veg.* iv. 62.—Rhizome long, slender, branched, creeping, clothed with chaffy ferruginous scales. Stipes 2–6 in. long or more, slender, red-brown, smooth and polished, sparingly scaly. Fronds tufted along the rhizome; sterile shorter than the fertile, 4–18 in. long including the stipes, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, often spreading or decumbent, linear or linear-lanceolate, narrowed to the base, dark-green, pinnatifid or pinnate towards the base, texture varying from thick and coriaceous to almost membranous. Pinnæ numerous, close-set, short, spreading, $\frac{1}{5}$ – $\frac{1}{3}$ in. long, attached by a broad base, ovate-oblong or triangular-oblong to linear-oblong, obtuse, entire or obscurely crenate. Fertile fronds erect, pinnate throughout; pinnæ numerous, rather distant, shorter and narrower than the sterile, linear or linear-oblong, obtuse, spreading or deflexed or sometimes curved upwards. Sori copious, covering the whole under-surface.—*Hook. Fil. Exot.* t. 32; *Sp. Fil.* iii. 16; *Hook. f. Fl. Antarct.* ii. 393, t. 150; *Fl. Nov. Zel.* ii. 30; *Handb. N.Z. Fl.* 368; *Hook. f. Bak. Syn. Fil.* 178; *Benth. Fl. Austral.* vii. 736; *Thoms. N.Z. Ferns*, 66; *Field, N.Z. Ferns*, 105, t. 17, f. 5, 5A. *L. pumila*, *Raoul, Choix*, 9, t. 2A; *Hook. Sp. Fil.* iii. 17; *Hook. f. Fl. Nov. Zel.* ii. 28; *Handb. N.Z. Fl.* 367. *L. linearis*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 16. *L. parvifolia*, *Col. in Trans. N.Z. Inst.* xx. (1888) 224. *Stegania alpina*, *R. Br. Prodr.* 152. *Blechnum alpinum*, *Metten. Fil. Hort. Bot. Lips.* 64. *Polypodium penna-marina*, *Poir. in Lam. Encycl.* v. 520.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, ANTIPODES ISLAND, MACQUARIE ISLAND: From the Upper Thames Valley and Rotorua southwards, abundant to the south of the East Cape. Sea-level to 4000 ft.

Also abundant in temperate South America, Australia, and Tasmania. *Raoul's L. pumila* differs from the type in the more membranous fronds and distinctly crenate pinnæ, but is without doubt a trivial state produced by growing in an unusually sheltered and shaded locality. Specimens exactly resembling *Raoul's* plate can be found without any difficulty in both islands, and can generally be traced on the spot into ordinary *L. alpina*. I look upon it as a form too inconstant to keep up even as a variety. *L. parvifolia*, *Col.*, of which I possess a type specimen forwarded by *Mr. Colenso* himself, is clearly the same, a view which is also taken by *Mr. Baker* (*Ann. of Bot.* v. (1891) 220).

9. *L. capensis*, *Willd. Sp. Plant.* v. 291.—Rhizome short, stout, often woody, erect or inclined, sometimes prostrate, clothed at the top with large chestnut-brown scales. Stipes stout, long or short, usually densely scaly at the base. Fronds numerous, very variable in size, usually from 1–4 ft., but in dry exposed places

often dwarfed to a few inches, while on the sides of deep wooded ravines they are occasionally 8-10 ft. long or even more; sterile ovate or oblong-ovate to oblong-lanceolate, erect or pendulous, very coriaceous to almost membranous, bright-green to brownish-green, pinnate throughout; rhachis stout, more or less scaly, especially when young. Pinnæ often very numerous, but in small specimens and in var. *minor* frequently reduced to 4-6 pairs, alternate, horizontally spreading, 3-12 in. long or more, $\frac{1}{2}$ -1 in. broad, acute or acuminate, oblique at the base and cuneate or truncate or rounded-cordate or even auriculate, sessile by the midrib alone or the uppermost more or less adnate; margins minutely toothed; costæ more or less scaly. Veins free, close, parallel, usually forked at the base. Fertile pinnæ very narrow-linear, distant, 3-9 in. long, $\frac{1}{8}$ - $\frac{1}{4}$ in. broad, usually on separate fronds, but often mixed with sterile pinnæ or the pinnæ partly fertile and partly sterile. Indusium broad, membranous, lacerate.—*F. Muell. Veg. Chath. Is.* 72; *Benth. N.Z. Austral.* vii. 737. *L. procera*, *Spreng. Syst. Veg.* iv. 65; *A. Cunn. Precur.* n. 182; *Raoul, Choix*, 37; *Hook. Ic. Plant.* t. 427, 428; *Sp. Fil.* iii. 22; *Garden Ferns*, t. 53; *Hook. f. Fl. Antarct.* i. 110; *Fl. Nov. Zel.* ii. 27; *Handb. N.Z. Fl.* 366; *Hook. and Bak. Syn. Fil.* 179; *Thoms. N.Z. Ferns*, 67; *Field, N.Z. Ferns*, 107, t. 2, f. 1, 1A. *L. latifolia*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 15. *L. duplicata*, *Potts in Trans. N.Z. Inst.* ix. (1877) 491. *Stegania procera*, *R. Br. Prodr.* 153; *A. Rich. Fl.* 86, t. 13. *Osmunda capensis*, *Linn. Mant.* 306. *O. procera*, *Forst. Prodr.* n. 414. *Blechnum capense*, *Schlecht. Adumb. Fil.* 34, t. 18.

Var. *a*, *Hook. f. Fl. Nov. Zel.* ii. 27.—Usually tall and robust. Sterile pinnæ truncate or broadly cuneate at the base.

Var. *b*, *Hook. f. l.c.*—Usually tall and robust. Sterile pinnæ cordate or auriculate at the base.

Var. *c*, *Hook. f. l.c.*—Usually tall and robust. Sterile pinnæ narrowed at the base.

Var. *d*, **minor**, *Hook. f. l.c.*—Smaller, 1-3 ft. high, dark olive-green; fertile fronds usually exceeding the sterile. Sterile pinnæ few, 4-8 pairs, short, broad, linear-oblong, the lowermost hardly shorter than the one above it, upper often adnate.—*Stegania minor*, *R. Br. Prodr.* 153.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant throughout, ascending to 4000 ft.

A very widely distributed species. From Australia and Tasmania it extends northwards to Malaya, and is common in many of the Pacific islands. In America it ranges from the south of Chili northwards to Mexico and the West Indies. It is also found in South Africa. In New Zealand it occurs in all soils and situations, and, although attaining its greatest luxuriance in deep forest ravines, is plentiful in open swamps and gullies, and even not averse to bare hillsides or the clefts of rocky peaks. At first it is difficult to believe that the small forms found in exposed places, often not more than 6 in. high, with 3-4 pairs of pinnæ, can belong to the same species as the huge specimens growing on moist cliffs in shaded ravines, in which the fronds are sometimes 8-10 ft. long, with more than 40 pairs of pinnæ. But every gradation of size exists,

and one form can be traced directly into the other. I have kept up the four varieties established by Sir J. D. Hooker in the Flora, although the first three do not seem to be separated by any well-defined characters. Var. *minor* is more distinct; and in some respects approaches *L. vulcanica*. It has a different habit and mode of growth, and may prove to be a separate species.

In nearly all the species of *Lomaria* the fertile fronds are sometimes irregularly mixed with sterile pinnæ, but in none is this so commonly seen as in *L. capensis*. Sometimes one side of the frond may be fertile and the opposite side sterile, or the sterile and fertile pinnæ may be irregularly mixed. Or sometimes the upper half of the frond may be fertile and the lower sterile, or *vice versâ*. It is also quite common for the pinnæ themselves to be partly fertile and partly sterile. The frond is also occasionally once or twice dichotomously forked, constituting Mr. Potts's *L. duplicata*, and sometimes the tips of the fronds are regularly crested.

10. **L. filiformis**, A. Cunn. *Precur.* n. 183.—Rhizome long, stout, branched, climbing up trees to a great height, clothed with squarrose scales. Sterile fronds very numerous, scattered along the rhizome, pinnate throughout, of two forms; those on the ground or on the lower part of the rhizome small, 3–6 in. long, $\frac{1}{2}$ –1 in. broad, linear or linear-lanceolate; pinnæ $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong to orbicular-oblong, sharply and deeply toothed. Fronds from the upper part of the rhizome much larger, 1–2 $\frac{1}{2}$ ft. long, 3–6 in. broad, lanceolate, pendulous, hardly coriaceous, dark-green, glabrous or more or less scaly along the rhachis and costæ; stipes short, scaly at the base. Pinnæ numerous, 1 $\frac{1}{2}$ –4 in. long, about $\frac{1}{2}$ in. broad, lanceolate, falcate, narrowed upwards into a finely acuminate point, shortly stipitate and truncate or rounded or cordate at the base, margins regularly and finely crenate-dentate. Fertile fronds from near the top of the rhizome, ovate or ovate-oblong in outline; pinnæ numerous, 3–6 in. long, $\frac{1}{8}$ in. broad, very narrow-linear or almost filiform. Indusium very narrow.—*Raoul, Choix*, 37; *Hook. Sp. Fil.* iii. 33, t. 149; *Hook. f. Handb. N.Z. Fl.* 366; *Hook. and Bak. Syn. Fil.* 180; *Thoms. N.Z. Ferns*, 68; *Field, N.Z. Ferns*, 109, t. 10, f. 3, 3A, 3B. *L. propinqua*, A. Cunn. *Precur.* n. 184. *L. pimpinellifolia*, *Hook. f. in Hook. Lond. Journ. Bot.* iii. (1844) 412. *Stenochlæna heteromorpha*, *J. Sm. in Hook. Lond. Journ. Bot.* iv. (1845) 149; *Hook. f. Fl. Nov. Zel.* ii. 46; *Brack. Fil. U.S. Expl. Exped.* 77. *Osmunda reptans*, *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* ii. 46. *Blechnum reptans*, *Christ*.

NORTH AND SOUTH ISLANDS: In forests from the North Cape southwards to Nelson and Marlborough, abundant. Sea-level to 2000 ft.

Also recorded from the Fiji Islands. A most distinct species, remarkable for its very long climbing rhizome and dimorphic sterile fronds.

11. **L. nigra**, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 16.—Rhizome short, stout, suberect, clothed with the bases of the old stipites mixed with chaffy scales. Stipes slender, densely scaly, 1–3 in. long. Sterile fronds tufted at the top of the rhizome, spreading, 3–8 in. long, 1–1 $\frac{1}{2}$ in. broad, linear-oblong, membranous,

blackish-green or lurid-green, brittle when dry, glabrous or the margins and under-surface more or less clothed with short rufous hairs, lyrate-pinnatifid, pinnate at the base; rhachis usually densely pubescent. Pinnæ 4–8 pairs, unequal in size; the terminal one much the largest, 1–2 in. long, oblong, obtuse, irregularly lobed or sinuate; the lateral $\frac{1}{4}$ – $\frac{3}{4}$ in. long, oblong to orbicular-oblong, irregularly sinuate, the lowest pair larger than those immediately above, and often stipitate and deflexed. Fertile fronds few, erect, pinnate; pinnæ few, distant, narrow-linear, apiculate, the terminal one elongated, the lateral much shorter.—*Hook. Ic. Plant.* t. 960; *Sp. Fil.* iii. 35; *Hook. f. Fl. Nov. Zel.* ii. 31; *Handb. N.Z. Fl.* 369; *Hook. and Bak. Syn. Fl.* 181; *Thoms. N.Z. Ferns*, 69; *Field, N.Z. Ferns*, 110, t. 25, f. 4, 4A. *Polybotrya nana*, *Fée. Acrost.* t. 38, f. 1. *Blechnum nigrum*, *Mett.*

NORTH ISLAND: Dark gloomy forests from Whangarei southwards, not common. SOUTH ISLAND: Nelson—Collingwood, *D. Grant*; Takaka and West Wanganui, *Kingsley*. Westland—Abundant at low elevations, *Enys*! *A. Hamilton*! *J. W. Brame*! &c. Otago—Milford Sound, Bligh's Sound, *Lyall*, *Hector* and *Buchanan*. Sea-level to 3000 ft.

Easily recognised by the enlarged terminal portion of the frond, which is often only shallowly lobed, while the lower pinnæ are usually distinct from one another. The surface of the frond is often overgrown with mosses or hepaticæ, in the same manner as in *Trichomanes elongatum*.

12. *L. fluviatilis*, *Spreng. Syst. Veg.* iv. 65.—Rhizome stout, suberect, often woody, densely clothed with the bases of the old stipites and with chestnut-brown subulate scales. Stipes very short, densely scaly. Sterile fronds very numerous, forming a broad spreading crown at the top of the rhizome, 1–2½ ft. high, $\frac{3}{4}$ –1½ in. broad, linear or linear-lanceolate, submembranous, pale brownish-green, pinnate throughout; rhachis densely clothed with spreading subulate scales. Pinnæ very numerous, 20–50 pairs, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, oblong to orbicular-oblong, obtuse, not decurrent, the lower more remote and often shortly stipitate, the upper sessile, the uppermost usually adnate; margins thin, sinuate or denticulate. Fertile fronds narrow-linear, erect; pinnæ $\frac{1}{3}$ – $\frac{2}{3}$ in. long, $\frac{1}{8}$ in. broad, linear, obtuse, erecto-patent.—*Hook. Sp. Fil.* iii. 34; *Hook. f. Fl. Nov. Zel.* ii. 28; *Fl. Tasm.* ii. 142, t. 167; *Handb. N.Z. Fl.* 366; *Hook. and Bak. Syn. Fil.* 181; *Benth. Fl. Austral.* vii. 736; *Thoms. N.Z. Ferns*, 69; *Field, N.Z. Ferns*, 109, t. 27, f. 2, 2A. *L. rotundifolia*, *Raoul, Choix*, 9, t. 23; *Col. in Tasmanian Journ. Nat. Sci.* (1845) 19. *Stegania fluviatilis*, *R. Br. Prodr.* 152. *Blechnum fluviatile*, *Mett.*

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND: From Hokiang and Whangaroa southwards, not uncommon in damp hilly forests. Sea-level to 2500 ft.

Also in Victoria and Tasmania. A crested form is occasionally seen, and has been described by Mr. Colenso as var. *ramosa* (*Trans. N.Z. Inst.* xx. 225).

13. **L. membranacea**, *Col. ex Hook. Sp. Fl.* iii. 34, t. 145.—Rhizome short, stout, suberect, clothed with the bases of the old stipites mixed with a few subulate scales. Stipes very short, scaly at the base. Fronds tufted at the top of the rhizome, the sterile ones 3–10 in. long, $\frac{3}{4}$ – $1\frac{1}{2}$ in. broad, lanceolate or linear-lanceolate, acuminate, broadest above the middle, gradually narrowed to the base, rather membranous, pale-green, quite glabrous, pinnate; rhachis smooth, naked. Pinnæ numerous, spreading or erectopatent, the longest $\frac{1}{2}$ – $\frac{3}{4}$ in. long, about $\frac{1}{4}$ in. broad, ovate-oblong or oblong, obtuse, broadly adnate at the base but not dilated nor decurrent, coarsely dentate-serrate, the lower quite distinct at the base, gradually becoming smaller and eventually reduced to mere rounded auricles, the uppermost more or less confluent. Fertile fronds usually longer than the sterile and with longer stipites, pinnate; pinnæ distant, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, linear, apiculate.—*Hook. f. Handb. N.Z. Fl.* 366; *Hook. and Bak. Syn. Fil.* 181; *Thoms. N.Z. Ferns*, 69; *Field, N.Z. Ferns*, 111, t. 5, f. 6, 6A. *L. oligoneuron*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 346. *L. intermedia*, *Col. l.c.* xix. (1887) 274; *L. pygmæa*, *Col. l.c.* xxv. (1893) 322. *Blechnum membranaceum*, *Mett.*

NORTH ISLAND: Shaded places by the banks of streams, not uncommon throughout. SOUTH ISLAND: In various localities along the east coast from Nelson to Otago, but apparently rare and local. Sea-level to 2000 ft.

Large forms of this, with longer and narrower pinnæ rather more closely placed, are difficult to distinguish from *L. lanceolata*, if, indeed, the two species do not pass directly into one another. In its usual state, however, it is a much smaller plant, with shorter and broader obtuse pinnæ, distinctly separated from one another, and not dilated at the base or decurrent as in *lanceolata*. I have seen no specimens from Canterbury or Otago.

14. **L. Fraseri**, *A. Cunn. Precur.* n. 185.—Rhizome erect, clothed with the bases of the old stipites and with a dense tuft of dark chestnut-brown scales at the tip, often elongated into a slender caudex 6–24 in. high or more, resembling the trunk of a miniature tree-fern. Stipes 3–9 in. high, scaly towards the base. Fronds forming a spreading crown at the top of the caudex, 9–18 in. long, 3–6 in. broad, ovate or ovate-oblong to ovate-lanceolate, acuminate, quite glabrous, almost membranous or subcoriaceous, bipinnate; rhachis with a narrow interrupted wing furnished with numerous triangular lobes. Pinnæ 2–3 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, lanceolate or linear-lanceolate, acuminate, cut down almost to the rhachis. Pinnules numerous, close-set, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, linear-oblong, somewhat falcate, acute or apiculate, entire or serrate. Veins indistinct, simple or forked. Fertile fronds similar to the sterile, but rather smaller and with narrower pinnules. Sori covering the whole under-surface.—*Raoul, Choix*, 37; *Hook. Ic. Plant.* t. 185; *Sp. Fil.* iii. 40; *Hook. f. Fl. Nov. Zel.* ii. 31; *Handb. N.Z. Fl.* 369; *Hook. and Bak. Syn. Fil.* 182; *Thoms. N.Z. Ferns*, 70; *Field, N.Z. Ferns*, 111, t. 24, f. 4, 4A. *Blechnum Fraseri*, *Metten.*

NORTH ISLAND: Abundant in dry woods from the North Cape southwards to the Upper Waikato and Taranaki. SOUTH ISLAND: Nelson—Massacre Bay, *Lyall*; West Wanganui, *Kingsley*; extending along the West Coast as far south as Charlestown, *Kirk*. Sea-level to 2000 ft.

A very handsome and distinct species, confined to New Zealand, unless a plant lately discovered in the Philippine Islands should prove to be the same.

17. DOODIA, R. Br.

Rhizome short, tufted, suberect. Fronds numerous at the top of the rhizome, erect, harsh and rigid or membranous, pinnate or pinnatifid, sometimes dimorphic. Veins forked, connected by short cross veinlets on which the sori are placed. Sori oblong or slightly curved, in one or more rows parallel to the midrib, and between it and the margin of the pinnæ. Indusium the same shape as the sorus, attached to the cross veinlet, membranous, opening towards the midrib. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

A small genus of 5 species, found in New Zealand, Australia and Polynesia, and Ceylon.

Fronds 1-2 ft., harsh, coriaceous, erect; the sterile not obviously differing from the fertile 1. *D. media*.
Fronds $\frac{1}{2}$ -1 ft., submembranous; the sterile shorter and less erect, with broader obtuse pinnæ. Fertile pinnæ narrow-linear, with conspicuous auricled bases .. 2. *D. caudata*.

1. *D. media*, R. Br. *Prodr.* 151.—Rhizome short, stout, suberect, clothed with the bases of the old stipites. Stipes 3-8 in. long, more or less clothed with subulate scales towards the base, smooth or scabrous, blackish-brown. Fronds 12-18 in. long, $1\frac{1}{2}$ -4 in. broad, lanceolate, acuminate, coriaceous, dark-green, pinnate in the lower half or two-thirds, pinnatifid above; rhachis often pubescent. Pinnæ numerous, spreading; lateral 1-2 in. long, $\frac{1}{5}$ - $\frac{1}{3}$ in. broad, linear or linear-lanceolate, acute or obtuse, spinulose-dentate, the upper ones dilated and confluent at the base, those below the middle free but often dilated or almost auricled at the base, the lower ones gradually reduced in size; terminal pinna often elongated. Sori short, oblong, usually in one series on each side of the midrib, but sometimes portions of a second row are irregularly developed.—*Hook. Sp. Fil.* iii. 74; *Hook. f. Handb. N.Z. Fl.* 370; *Hook. and Bak. Syn. Fil.* 190; *Thoms. N.Z. Ferns*, 70; *Field, N.Z. Ferns*, 112, t. 20, f. 1. *D. aspera*, A. Rich. *Fl. Nouv. Zel.* 76; A. Cunn. *Precur.* n. 195; Raoul, *Choix*, 38 (not of R. Br.). *D. Kunthiana*, Gaud. in *Freye. Voy. Bot.* 401, t. 14; A. Cunn. *Precur.* n. 197; Raoul, *Choix*, 38.

Var. *Milnei*, Bak. *Syn. Fil.* (edit. 2) 482.—Larger; fronds 1-2 ft. long or more, 6-12 in. broad. Pinnæ closely placed, 4-6 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, narrowed into long acuminate points, sharply dentate-serrate. Sori copious, in 2 rows on each side of the midrib.—*D. Milnei*, Carr. in *Seem. Fl. Viti.* 352. *D. connexa*, Hook. f. *Handb. N.Z. Fl.* 369 (not of Kunze).

NORTH ISLAND: Abundant from the North Cape to the East Cape, from thence rare and local to Cook Strait. SOUTH ISLAND: Nelson—Port Hills, *Kirk!* Var. *Milnei*.—KERMADEC ISLANDS: Abundant, *MacGillivray*, T. F. C. Sea-level to 1000 ft.

Also in Australia, Norfolk Island, and the Pacific islands as far north as Hawaii. A very variable plant.

2. *D. caudata*, *R. Br. Prodr.* 151.—Rhizome short, suberect, emitting numerous black wiry rootlets. Stipes 2–4 in. long, slender, black, smooth or nearly so. Fronds numerous, densely tufted, 3–12 in. long, rarely more, $\frac{3}{4}$ –2 in. broad, lanceolate, acuminate or caudate, usually membranous, pale-green, pinnate almost to the top, more or less dimorphic; sterile usually shorter than the fertile and less erect, often decumbent, sometimes almost flaccid; pinnæ oblong or linear-oblong, obtuse, sharply serrate. Fertile fronds longer, usually harsher and more rigid, erect; pinnæ $\frac{1}{2}$ –1½ in. long, $\frac{1}{8}$ – $\frac{1}{5}$ in. broad, narrow-linear, often attenuate, the lower ones usually conspicuously auricled at the base, the uppermost decurrent and confluent, terminal pinna usually very long, caudate. Sori in a single series on each side of the midrib.—*A. Rich. Fl. Nouv. Zel.* 76; *A. Cunn. Precur.* n. 196; *Raoul, Choix*, 38; *Hook. f. Fl. Nov. Zel.* ii. 37 (*excl. syn.*); *Hook. and Bak. Syn. Fil.* 190; *Field, N.Z. Ferns*, 114, t. 20, f. 4, 4A. *D. squarrosa*, *Col. in Trans. N.Z. Inst.* xiii. (1881) 382.

NORTH ISLAND: From Kaitaia southwards to Cook Strait, but local and often absent from large areas. Sea-level to 2500 ft.

Apparently a common Australian plant, ranging from Cape York to Tasmania. Some of the New Zealand forms approach very close to the preceding species; but usually it can be distinguished by the smaller size, by the sterile fronds being of a different shape and more flaccid than the fertile, and by the narrow fertile pinnæ with conspicuously auricled bases. A small variety found on the Rimutaka Range, Wellington, is said to have scented fronds, and to have been formerly collected by the Maoris for the purpose of mixing with oil to anoint the person; but I have never been able to perceive any fragrance. Perhaps *Polypodium pustulatum* has been mistaken for it. I have seen no authentic specimens of Colenso's *D. squarrosa*, and have followed Mr. Baker (*Ann. Bot.* v. (1891) 221) in referring it to *D. caudata*.

18. *ASPLENIUM*, Linn.

Rhizome usually short and thick, more rarely long and creeping. Fronds tufted at the top of the rhizome or scattered, stipitate, pinnate or 2–3-pinnate or decompound, simple and entire in a few species not found in New Zealand. Venation variable, free in the great mass of the species, including those found in New Zealand. Sori linear or oblong, placed upon the veins, more or less oblique with respect to the costa, remote from the margin or close to it when the frond is much divided. Indusium the same shape as the sorus, attached by its side to the vein, straight or rarely curved, flat

or tumid, single or double (diplazioid), when single opening towards the costa or midrib, when double opening in opposite directions. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

Taken in the sense of the "Synopsis Filicum" this is one of the largest genera of Ferns, containing about 350 species, distributed through both the tropical and temperate regions of the world. Of the 12 species found in New Zealand, 1 appears to be endemic, another is found elsewhere only in Australia, the remaining 10 are widely spread. The New Zealand species present exceptional difficulties to the student, on account of their extreme variability and the manner in which several of them are connected by intermediate forms. Thus *A. obtusatum* and *A. lucidum* not only run into one another, but are connected by transitional varieties with *A. bulbiferum* and *A. flaccidum*. *A. Richardi* almost merges into *A. flaccidum* on the one side and *A. Hookerianum* on the other, while *A. bulbiferum* and *A. flaccidum*, distinct enough in their ordinary states, are almost united by some of their aberrant varieties. With such a complex network of variation it is not surprising that the species are difficult of limitation and their characters arbitrary.

Subgenus I. EUASPLENIUM. Veins free, simple or forked. Indusium flat or nearly so, single, not double nor diplazioid.

* Fronds pinnate (2-pinnate below in *A. lucidum* var. *Lyallii*). Sori remote from the margin.

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|--|-------------------------------|
| Fronds slender, 6-14 in., decumbent or prostrate, rooting at the naked tip. Pinnæ $\frac{1}{4}$ - $\frac{1}{2}$ in., flabellate | 1. <i>A. flabellifolium</i> . |
| Fronds slender, 3-12 in., rigid, erect. Pinnæ $\frac{1}{4}$ - $\frac{1}{2}$ in., oblong or obovoid | 2. <i>A. Trichomanes</i> . |
| Fronds 1-2 ft., coriaceous, not fleshy, brownish-green. Pinnæ $1\frac{1}{2}$ -4 in. \times $\frac{1}{2}$ -1 in., broadly lanceolate, acuminate, deeply lobed. Veins close, distinct, flabellately divided at the base of the pinnæ | 3. <i>A. falcatum</i> . |
| Characters of <i>A. falcatum</i> but pinnæ narrow-lanceolate, caudate | 4. <i>A. caudatum</i> . |
| Fronds $\frac{1}{2}$ -1 $\frac{1}{2}$ ft., thick and fleshy. Pinnæ $\frac{3}{4}$ -1 $\frac{1}{2}$ in., oblong, obtuse. Veins obscure, parallel | 5. <i>A. obtusatum</i> . |
| Fronds 1-3 ft., coriaceous, bright-green. Pinnæ 2-6 in. \times $\frac{3}{4}$ -2 in., oblong-lanceolate, acuminate, serrate. Veins obscure, parallel | 6. <i>A. lucidum</i> . |

** Fronds 2-3-pinnate; segments generally narrow. Sori usually one to each segment, often close to the margin.

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|--|----------------------------|
| Fronds 3-12 in., erect, membranous, usually 2-pinnate. Pinnæ and pinnules distinctly stipitate, the latter short, rhomboid-cuneate. Sori few, rather large | 7. <i>A. Hookerianum</i> . |
| Fronds 1-4 ft., oblong-lanceolate, erect or drooping, often proliferous, 2-3-pinnate. Pinnules lanceolate, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long | 8. <i>A. bulbiferum</i> |
| Fronds 6-12 in., ovate, coriaceous, rigid, erect, 2-3-pinnate. Pinnules ovate-rhomboid, pinnatifid; segments narrow-linear, $\frac{1}{2}$ - $\frac{3}{8}$ in. long | 9. <i>A. Richardi</i> . |
| Fronds $\frac{1}{2}$ -3 ft., pendulous or erect, thick and coriaceous, pinnate or 2-pinnate. Pinnules very narrow-linear | 10. <i>A. flaccidum</i> . |

Subgenus II. ATHYRIUM. Veins free, forked. Sori short; indusium tumid or almost cylindrical, more or less curved.

Fronds 1-4 ft., broadly ovate or deltoid, membranous,
2-3-pinnate 11. *A. umbrosum*.

Subgenus III. DIPLAZIUM. Veins free, pinnately branched. Indusia linear or linear-oblong, some of them (often the lowest only) double and then opening in opposite directions.

Fronds 6-12 in., ovate-lanceolate, membranous, pinnate;
pinnæ $1\frac{1}{2}$ -3 in., deeply pinnatifid 12. *A. japonicum*.

1. **A. flabellifolium**, *Cav. Demonstr.* 257.—Rhizome short, stout, clothed at the top with blackish-brown subulate scales. Stipes 1-4 in. long, rarely more, slender, flexuous, smooth or slightly scaly, green above, dark-brown below. Fronds few, tufted at the top of the rhizome, weak, decumbent or prostrate, rooting at the elongated and naked apex, 6-14 in. long, $\frac{1}{2}$ -1 in. broad, linear, membranous, flaccid, pinnate; rhachis smooth, green. Pinnæ 10-25 pairs, distant, the upper becoming gradually smaller and disappearing some distance below the tip of the rhachis, very variable in size and shape, shortly stipitate, $\frac{1}{4}$ - $\frac{1}{2}$ in. long and broad, flabellate or rhomboid-cuneate or orbicular-reniform, sometimes auricled or almost 3-lobed at the base, coarsely crenate-toothed; veins flabellate. Sori several to each pinna, oblique, linear-oblong when young, often confluent when old.—*A. Cunn. Precur.* n. 192; *Raoul, Choix*, 37; *Hook. Exot. Fil.* t. 208; *Sp. Fil.* iii. 146; *Hook. f. Fl. Nov. Zel.* ii. 33; *Handb. N.Z. Fl.* 372; *Hook. and Bak. Syn. Fil.* 195; *Benth. Fl. Austral.* vii. 745; *Thoms. N.Z. Ferns*, 73; *Fieid, N.Z. Ferns*, 116, t. 6, f. 6.

NORTH AND SOUTH ISLANDS: Open rocky places from the Bay of Islands to Otago, not uncommon. Sea-level to 2000 ft.

Also in temperate Australia and Tasmania. Sometimes the upper pinnæ are produced into naked tips which root like the apex of the frond. This state has been described by Mr. Colenso as var. *ramosum* (*Trans. N.Z. Inst.* xx. 228).

2. **A. Trichomanes**, *Linn. Sp. Plant.* 1540.—Rhizome short, thick, fibrous, clothed at the top with linear-subulate blackish scales. Stipes 1-4 in. long, naked, dark chestnut-brown, smooth and glossy, narrowly margined above. Fronds tufted at the top of the rhizome, rigid, erect, 3-12 in. long, $\frac{1}{3}$ - $\frac{2}{3}$ in. broad, linear, subcoriaceous, pinnate; rhachis red-brown, margined throughout. Pinnæ 15-40 pairs, spreading, sessile or nearly so, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, oblong or obovate, rounded at the tip, obliquely cuneate at the base, sometimes auricled on the upper edge, margins crenate-serrate. Veins few, indistinct, oblique, forked above the middle. Sori oblique, linear-oblong, 3-6 on each side of the pinna, often confluent when old.—*Hook. Sp. Fil.* iii. 136; *Hook. f. Handb. N.Z.*

Fl. 371; *Hook. and Bak. Syn. Fil.* 196; *Benth. Fl. Austral.* vii. 745; *Thoms. N.Z. Ferns*, 73; *Field, N.Z. Ferns*, 115, t. 28, f. 8. *A. melanolepis*, *Col. in Trans. N.Z. Inst.* xx. (1888) 227.

NORTH ISLAND: Hawke's Bay—Kaimanawa Mountains, *Captain G. Mair!* *Petane, A. Hamilton!* *Puketapu, Colenso!* Taranaki—Mount Egmont, *T. F. C. Wellington*—Taranua Range, *Buchanan.* SOUTH ISLAND: Not uncommon in mountainous localities throughout. Sea-level to 4000 ft.

Widely distributed in the temperate regions of both hemispheres and on high mountains in the tropics.

3. *A. falcatum*, *Lam. Encycl.* ii. 306.—Rhizome short, stout, creeping, more or less clothed with dark-brown scales. Stipes 6–12 in. long, dark-brown, firm, villous and paleaceous at the base and sometimes throughout. Fronds erect or pendulous, 1–3 ft. long or more, 3–7 in. broad, linear-lanceolate or lanceolate, acuminate, coriaceous, dark-green or brownish-green above, paler beneath, glabrous or deciduously paleaceous, pinnate; rhachis bristly with linear scales or almost glabrous. Pinnæ 12–25 pairs, spreading, stipitate, $1\frac{1}{2}$ –4 in. long, $\frac{1}{2}$ –1 in. broad, lanceolate, finely acuminate, obliquely cuneate at the base, the upper edge broad and rounded or sometimes auricled, the lower edge excised, lobed or almost pinnatifid, lobes sharply incised. Veins distinct, close, erecto-patent, forked, the basal ones almost flabellate. Sori numerous, linear, obliquely diverging from the midrib, almost reaching the margin. Indusium narrow, membranous but firm.—*A. Rich. Fl. Nouv. Zel.* 73; *A. Cunn. Precur.* n. 187; *Raoul, Choix*, 37; *Hook. Sp. Fil.* iii. 160; *Hook. f. Handb. N.Z. Fl.* 372; *Hook. and Bak. Syn. Fil.* 208; *Benth. Fl. Austral.* vii. 746; *Thoms. N.Z. Ferns*, 74; *Field, N.Z. Ferns*, 117, t. 21, f. 5. *A. polyodon*, *Forst. Prodr.* n. 428; *A. Cunn. Precur.* n. 188; *Hook. f. Fl. Nov. Zel.* ii. 34. *A. Fors- terianum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 11.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: From the North Cape southwards, not uncommon in woods, often pendulous from trees. Sea-level to 2000 ft.

Also abundant in many parts of tropical Asia and Africa, the Pacific islands, and Australia. Very variable in the size and shape of the pinnæ, and the extent to which they are lobed and cut.

4. *A. caudatum*, *Forst. Prodr.* n. 432.—Rhizome short, creeping, clothed with dark-brown linear scales. Stipes 6–9 in. long, densely clothed with fibrillose scales or almost naked. Frond 1–2 ft. long, 3–8 in. broad, lanceolate or oblong-lanceolate, acuminate, coriaceous, dark-green, glabrous or deciduously villous, pinnate; rhachis bristly or almost glabrous. Pinnæ 15–30 pairs, spreading, stipitate, $1\frac{1}{2}$ –4 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, narrow-lanceolate, narrowed into a long acuminate point, obliquely cuneate at the base, the upper edge rounded or auricled, the lower edge excised, deeply lobed or pinnatifid, sometimes more than half-way down to the midrib, lobes

sharply incised. Veins distinct, close, oblique, forked. Sori shorter than in *A. falcatum*, in an oblique row close to the midrib of the pinnae, not nearly reaching the margin.—*Hook. Sp. Fil.* iii. 152; *Hook. f. Handb. N.Z. Fl.* 372; *Hook. and Bak. Syn. Fil.* 209; *Thoms. N.Z. Ferns*, 75; *Field, N.Z. Ferns*, 118.

KERMADEC ISLANDS: Sunday Island, not uncommon, *MacGillivray, T. F. C.*

A widely spread plant, found in most tropical regions. Doubtfully distinct from *A. falcatum*, from which it chiefly differs in the narrower and more caudate pinnae and shorter sori.

5. *A. obtusatum*, *Forst. Prodr.* n. 430.—Rhizome short, thick, often forming a hard rounded mass, densely clothed with large brown shining ovate-lanceolate scales. Stipes 2–6 in. long, erect, very stout, almost fleshy, greyish-green, densely scaly at the base. Fronds 2–12 in. long without the stipes, 1–3 in. broad, linear-oblong, acute, very thick and coriaceous or almost cartilaginous, glabrous or slightly paleaceous when young, pinnate; rhachis broad, often margined, channelled above. Pinnæ 6–20 pairs, close-set, often overlapping, shortly stipitate, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long, $\frac{1}{3}$ – $\frac{3}{4}$ in. broad, oblong or linear-oblong, obtuse and rounded at the apex, the terminal pinna alone acute, obliquely truncate-cuneate at the base; margins thick and cartilaginous, crenate-serrate. Veins obscure, simple or forked. Sori oblique to the midrib, usually copious, short, linear-oblong or linear, not reaching the margin.—*A. Cunn. Precur.* n. 191; *Raoul, Choix*, 37; *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 1, f. B, small specimen; *Hook. Sp. Fil.* iii. 96; *Hook. f. Fl. Nov. Zel.* ii. 33; *Handb. N.Z. Fl.* 371; *Hook. and Bak. Syn. Fil.* 207; *Benth. Fl. Austral.* vii. 747; *Thoms. N.Z. Ferns*, 73; *Field, N.Z. Ferns*, 118 *excl. all varieties quoted.*

KERMADEC ISLANDS: Abundant on maritime rocks, *MacGillivray, T. F. C., Miss Shakespear!* NORTH AND SOUTH ISLANDS: On maritime rocks and outlying islands from the Three Kings Islands and the North Cape to Foveaux Strait, but often local or absent from wide stretches of the coast. CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Apparently not uncommon near the sea.

A. obtusatum is here restricted to Forster's original plant, which appears to be purely littoral. It has a wide range outside New Zealand, being found in Australia and Tasmania, several of the Pacific islands, Juan Fernandez, the coasts of extra-tropical South America, Tristan d'Acunha, and Possession Island.

6. *A. lucidum*, *Forst. Prodr.* n. 427.—Rhizome short, stout, often forming a hard and woody rounded caudex, clothed at the top with large brown shining ovate-acuminate scales. Stipes 6–18 in. long, stout, terete or compressed, densely scaly at the base. Fronds 1–3 ft. long without the stipes, 6–14 in. broad, erect or pendulous, lanceolate to ovate-lanceolate or oblong-lanceolate, acuminate, dark-green and glossy, herbaceous or subcoriaceous, glabrous or slightly paleaceous beneath, pinnate; rhachis terete or compressed. Pinnæ

6-20 pairs, remote or rather close. stipitate, 2-6 in. long, $\frac{3}{4}$ -2 in. broad, lanceolate to oblong-lanceolate or elliptic-ovate, usually narrowed into a long acuminate point, often caudate, obliquely cuneate at the base, the upper edge rounded, the lower cut away; margins somewhat thickened, sinuate-serrate; veins usually evident, forked. Sori oblique to the midrib, very numerous, close, linear-elongate. — *A. Cunn. Precur.* n. 189; *Raoul, Choix*, 37; *Hook. Sp. Fil.* iii. 98; *Hook. f. Fl. Nov. Zel.* ii. 33; *Handb. N.Z. Fl.* 371. *A. obtusatum* var. *lucidum*, *Hook. and Bak. Syn. Fil.* 207; *Benth. Fl. Austral.* vii. 747; *Thoms. N.Z. Ferns*, 74; *Field, N.Z. Ferns*, 119, t. 13, f. 6.

Var. **obliquum**, *Moore, Ind. Fil.* 142.—Fronds smaller and more coriaceous, 12-18 in. long. Pinnæ more closely placed, 1-3 in. long, oblong-lanceolate, acute but not acuminate. Sori shorter. Approaches *A. obtusatum*.—*A. obliquum*, *Forst. Prodr.* n. 429. *A. apice-dentatum*, *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 1A, and *A. obtusatum*, t. 1B, large specimen. *A. obtusatum* var. *obliquum*, *Hook. f. Fl. Antarct.* i. 108; *Fl. Nov. Zel.* ii. 33; *Handb. N.Z. Fl.* 371; *Hook. Sp. Fil.* iii. 96; *Hook. and Bak. Syn. Fil.* 207.

Var. **scleroprium**, *Moore, Ind. Fil.* 142.—Fronds fleshy and coriaceous, 12-18 in. high or more. Pinnæ closely placed, 2-4 in. long, about $\frac{1}{2}$ in. broad, linear-lanceolate, caudate-acuminate, closely and deeply serrate or pinnatifid, sometimes more than half-way down to the midrib. Sori linear, extending into the segments or teeth, and marginal to them. A transition form to *A. flaccidum*.—*A. scleroprium*, *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 1b; *Hook. f. Fl. Antarct.* i. 109; *Handb. N.Z. Fl.* 371; *Hook. Sp. Fil.* iii. 97. *A. flaccidum* var. *aucklandicum*, *Hook. f. Fl. Antarct.* i. 109.

Var. **Lyallii**, *Hook. f. Fl. Nov. Zel.* ii. 33, t. 77.—Size and habit of the type; but the inferior pinnæ lanceolate-deltoid, cut down to the rachis in the lower part into distinctly stipitate pinnules; intermediate pinnæ more or less deeply lobed, especially on the upper margin, lobes crenate.—*Handb. N.Z. Fl.* 371; *Hook. Sp. Fil.* iii. 99. *A. Lyallii*, *Moore, Ind. Fil.* 143.

Var. **anomodum**, *Cheesem.*—Fronds small, 2-12 in. long including the stipes, pale-green, almost membranous or coriaceous, more or less paleaceous beneath. Pinnæ 3-8 pairs with a large terminal one, $\frac{1}{2}$ -2 in. long, oblong-lanceolate to oblong or oblong-ovate or broadly ovate, obtuse or acute, crenate, or the lower ones more or less deeply pinnatifid with the segments crenate. Sori short, linear-oblong.—*A. anomodum*, *Col. in Trans. N.Z. Inst.* xv. (1883) 309.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: The typical form widely distributed in lowland districts as far south as Stewart Island. Var. *obliquum* from the North Cape to Campbell Island. Var. *scleroprium*: Herekopere Island (near Stewart Island), *Kirk!* Auckland and Campbell Islands, plentiful, *Hombrook and Jacquinet, Hooker! Kirk!* Var. *Lyallii*: In various localities from the Bay of Islands (*Miss Clarke!*) to Otago, but rare and local, and always in small quantity. Chatham Islands, *Field, Miss Seddon!* Var. *anomodum*: Usually in limestone districts. Hawke's Bay—*Petane, A. Hamilton!* Te Aute, *C. P. Winkelmann!* Norsewood, *Colenso!* Takapau, *J. Stewart.* Nelson—Wangapeka Valley and Mount Arthur Plateau, ascending to nearly 4000 ft., *T. F. C.*

In the "Synopsis Filicum" *A. lucidum*, together with *A. obliquum*, is reduced to the position of a variety of *A. obtusatum*. This view has since been accepted by most pteridologists, mainly, I presume, on account of the undoubted fact that the three plants are more or less connected by transitional forms. But var. *scleroprium* also connects *A. lucidum* with *A. flaccidum*, while var. *Lyallii* offers a passage to *A. bulbiferum*, so that by parity of reasoning these two species should be included. This reduction was actually proposed by the late Baron Mueller in his Chatham Islands Florula (p. 66), but has found no followers. As arbitrary distinctions must in any case be employed, and as the differences between the typical *A. lucidum* and *A. obtusatum* are quite as well marked as those between several species of *Asplenium* universally admitted, I have retained both species in this work. *A. obliquum* has generally been placed with *A. obtusatum*, but its position is really a matter of taste, and to me it seems to fall more naturally under *A. lucidum*.

In addition to New Zealand, *A. lucidum* is found in Norfolk Island, Lord Howe Island, Australia, and some of the Polynesian islands.

7. ***A. Hookerianum***, Col. in *Tasmanian Journ. Nat. Sci.* (1845) 9.—Rhizome short, stout, rounded, emitting numerous fibrous roots, clothed at the top with subulate-lanceolate brownish scales. Stipes 1–4 in. long or more, greenish or greenish-grey, more or less clothed with deciduous scales, becoming almost glabrous when old. Fronds tufted at the top of the rhizome, spreading, 2–10 in. long without the stipes, 1–4 in. broad, oblong-lanceolate to broadly ovate or ovate-deltoid, acuminate, dark-green, herbaceous or almost membranous, pinnate or bipinnate; rhachis and under-surface more or less scaly. Pinnæ 4–12 pairs, the largest 1–3 in. long, distinctly stipitate, pinnate, or in small specimens pinnatifid or deeply lobed. Pinnules rather remote, on long slender petioles, usually rounded or rhomboid with a cuneate base, more rarely narrower and cuneate-oblong, irregularly toothed or lobed or even pinnatifid, rarely again pinnate. Veins subflabellate, forked. Sori 2–5 on a pinnule, short, oblong, remote from the margin.—*Hook. Sp. Fil.* iii. 194; *Moore, Ind. Fil.* 136; *Hook. f. Handb. N.Z. Fl.* 372; *Hook. and Bak. Syn. Fil.* 213; *Benth. Fl. Austral.* vii. 747; *Thoms. N.Z. Ferns*, 75; *Field, N.Z. Ferns*, 120, t. 16, f. 4A. *A. adiantoides*, *Raoul, Choix*, 10, t. 1. (not of *Raddi*). *A. adiantoides* var. *minus*, *Hook. f. Ic. Plant.* t. 983. *A. adiantoides* var. *Hookerianum*, *Hook. f. Fl. Nov. Zel.* ii. 35. *A. Raoulii* var. *minus*, *Mett. Aspl.* 118. *A. ornatum*, Col. in *Trans. N.Z. Inst.* xxii. (1890) 452.

Var. ***Colensoi***, *Moore, Ind. Fil.* 137. — Fronds pale-green, usually flaccid. Pinnules on shorter stalks, deeply and finely pinnatifid; segments linear, each with a single vein. Sori oblong, solitary on the margin of the segments.—*Hook. f. Handb. N.Z. Fl.* 373; *Thoms. N.Z. Ferns*, 75; *Field, N.Z. Ferns*, 120, t. 27, f. 1. *A. Colensoi*, *Hook. f. in Lond. Journ. Bot.* iii. (1844) 26; *Hook. and Bak. Syn. Fil.* 219. *A. adiantoides* var. *Colensoi*, *Hook. f. Ic. Plant.* t. 984; *Fl. Nov. Zel.* ii. 35. *A. Richardi* var. *Colensoi*, *Hook. Sp. Fil.* iii. 197.

NORTH AND SOUTH ISLANDS: From Mongonui and Kaitaia to the south of Otago, but often local. Sea-level to 2500 ft.

A variable little plant, said to be found also in New South Wales and Victoria, but I have seen no specimens from thence. Var. *Colensoi* was placed with *A. Richardi* by Sir W. J. Hooker, and is retained as a distinct species by Mr. Baker in the "Synopsis Filicum." But, as stated by Mr. Field (N.Z. Ferns, 120), it often grows intermixed with the type, and occasionally the fronds of both forms can be found on the same plant. Mr. Colenso's *A. ornatum* is simply a state with the pinnules rather narrower than usual, and on longer stalks.

8. ***A. bulbiferum*, Forst. Prodr. n. 433.**—Rhizome short, stout, erect or oblique, crowned with linear-subulate scales. Stipes 4–12 in. long or more, compressed or semiterete, usually dark-brown and densely scaly at the base, above green or greyish-green and either naked or deciduously scaly. Fronds 1–4 ft. long, 6–12 in. broad, ovate-lanceolate or oblong-lanceolate, acuminate, bright-green, scarcely membranous but flaccid, 2–3-pinnate or in small specimens pinnate; rhachis compressed, often scaly when young. Primary pinnæ numerous, horizontal, 3–6 in. long, 1–1½ in. broad, lanceolate or ovate-lanceolate, acuminate, often proliferous on the upper surface, cut down to a narrowly winged rhachis into numerous secondary divisions or pinnules. Pinnules ½–1½ in. long, lanceolate to ovate-oblong, deeply pinnatifid; ultimate segments linear-oblong, entire or toothed. Sori short, oblique, oblong, on the disc of the shortly lobed pinnules, but often marginal on the segments of the more deeply divided ones.—*A. Rich. Fl. Nouv. Zel.* 75; *A. Cunn. Precur. n.* 193; *Raoul, Choix*, 38; *Hook. Ic. Plant.* t. 423; *Sp. Fil.* iii. 196; *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 3, f. 1; *Hook. f. Fl. Nov. Zel.* ii. 34; *Handb. N.Z. Fl.* 373; *Hook. and Bak. Syn. Fil.* 218; *Benth. Fl. Austral.* vii. 748; *Thoms. N.Z. Ferns*, 75; *Field, N.Z. Ferns*, 121, t. 6, f. 5.

Var. ***laxum*, Hook. f. Fl. Nov. Zel.** ii. 34.—Fronds smaller and more slender, with narrower and more remote pinnæ. Pinnules more deeply divided; segments narrow-linear. Sori often marginal.—*Handb. N.Z. Fl.* 373; *Hook. Sp. Fil.* iii. 196; *Hook. and Bak. Syn. Fil.* 218. *A. laxum*, *R. Br. Prodr.* 151; *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 3, f. J. *A. gracillimum*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 453. (?) *A. triste*, *Raoul, Choix*, 10.

Var. ***tripinnatum*, Hook. f. Fl. Nov. Zel.** ii. 34.—Fronds ample, tripinnate, with narrow pinnules and segments resembling some forms of *A. flaccidum*, but more compound and texture thinner. Sori marginal on the segments.—*Handb. N.Z. Fl.* 373; *Hook. Sp. Fil.* iii. 196. *A. tremulum*, *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 3 bis.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, ANTIPODES ISLAND: Abundant throughout, especially in damp woods. *Moku.* Sea-level to 3000 ft.

The typical state of *A. bulbiferum* is a well-known plant throughout the whole of New Zealand, and is at once distinguished from the other species of the genus by the ample dark-green bipinnate fronds with comparatively broad pinnules, and especially by its habit of producing small bulbils on the upper surface of the frond, which develop into young plants while still attached to the frond. When the bulbils are not developed, and the frond is more slender, with narrower and more deeply divided pinnules, so that the sori are often almost marginal, the plant becomes var. *laxum*. This runs into several small

states not clearly separable, one of which is the *A. triste* of Raoul, and another Colenso's *A. gracillimum*. Var. *tripinnatum* has still narrower pinnules, deeply cut into narrow-linear segments, and the sori are quite marginal. It approaches very close to some states of *A. flaccidum*, but the frond is broader and more decompose, and the texture is thinner. In addition to the above varieties there are a large number of puzzling forms, which apparently connect the species with *A. falcatum*, *A. lucidum* var. *Lyallii*, *A. lucidum* var. *scleroprium*, *A. Hookerianum*, *A. Richardi*, and *A. flaccidum*. In Stewart Island, passage forms into *A. scleroprium* and *A. flaccidum* are particularly abundant, and it is often difficult to decide to which species they should be referred. It would occupy many pages to characterize these, and I doubt whether it is possible to define them in language sufficiently precise to enable them to be recognised with certainty.

A. bulbiferum in some of its forms is also found in Australia and Tasmania, many of the Pacific islands, Malaya, North India, South Africa, Mexico, and Central America.

9. **A. Richardi**, *Hook. f. Fl. Nov. Zel.* ii. 35.—Rhizome short, stout, usually forming a rounded knot-like caudex, clothed at the top with dark-brown subulate scales. Stipes tufted at the top of the rhizome, 2–6 in. long, stout, rigid, erect, greenish, usually clothed with linear scales, rarely almost glabrous. Fronds 3–9 in. long without the stipes, 1–4 in. broad, ovate or ovate-lanceolate, acuminate, dark-green, varying from almost membranous to coriaceous, somewhat rigid, 2–3-pinnate; rhachis smooth or bristly. Primary pinnæ 8–12 pairs, rather close, stipitate, $\frac{1}{2}$ –2 in. long, ovate-lanceolate to ovate; secondary crowded, often overlapping, ovate-rhomboid, pinnatifid or again pinnate. Ultimate segments $\frac{1}{12}$ – $\frac{1}{8}$ in. long, narrow-linear, obtuse or acute or mucronate, each with a single vein. Sori short, broad, oblong, on the margins of the segments.—*Handb. N.Z. Fl.* 373; *Hook. Sp. Fil.* iii. 197, *excl. var.* Colensoi; *Hook. and Bak. Syn. Fil.* 222; *Thoms. N.Z. Ferns*, 76; *Field, N.Z. Ferns*, 124, t. 28, f. 5. *A. adiantoides* var. *Richardi*, *Hook. f. Ic. Plant.* t. 977. *A. Raoulii* var. *Richardi*, *Metten. Aspl.* 118. *A. symmetricum*, *Col. in Trans. N.Z. Inst.* xxxi. (1899) 264.

NORTH ISLAND: Tararua Range, *Buchanan, H. C. Field*. SOUTH ISLAND: Not uncommon in hilly and mountainous districts throughout. Sea-level to 4000 ft.

A very puzzling plant. Small states with membranous fronds appear to pass directly into *A. Hookerianum* var. *Colensoi*, while larger and more coriaceous forms only differ from erect states of *A. flaccidum* in the more finely cut fronds and smaller segments.

10. **A. flaccidum**, *Forst. Prodr.* n. 426.—Rhizome short, stout, erect, clothed at the top with copious dark-brown subulate-lanceolate scales. Stipites tufted at the top of the rhizome, usually rather short, compressed or angled, greenish, scaly at the base, naked above. Fronds very variable in size and shape, 3 in. to 3 ft. long or more, 2–9 in. broad, the long-fronded varieties lanceolate or oblong-lanceolate, the shorter ones ovate or broadly ovate, acuminate, thick and coriaceous, flaccid and pendulous or rigid and

erect, pale-green, quite glabrous, pinnate or bipinnate. Pinnæ remote or rather close, 2-10 in. long, $\frac{1}{4}$ - $\frac{3}{4}$ in. broad, in the pendulous varieties narrow-linear to lanceolate, but in the small erect forms often much broader, acuminate or caudate, usually cut down to a narrowly winged rhachis into erecto-patent straight or incurved linear-oblong obtuse or acute lobes $\frac{1}{4}$ - $\frac{2}{3}$ in. long; or more rarely the pinnæ are again pinnate at the base, with the secondary divisions lobed or pinnatifid. Veins indistinct, a single one to each lobe. Sori oblong, usually on the margins of the lobes, rarely on the disc of the pinnæ.—*Hook. Sp. Fil.* iii. 205; *Hook. f. Fl. Nov. Zel.* ii. 35; *Handb. N.Z. Fl.* 374; *Hook. and Bak. Syn. Fil.* 222; *Benth. Fl. Austral.* vii. 749; *Thoms. N.Z. Ferns*, 76; *Field, N.Z. Ferns*, 123, t. 12, f. 2. *A. heterophyllum*, *A. Rich. Fl. Nouv. Zel.* 74. *Cœnopteris flaccida*, *Thumb. Nov. Act. Petrop.* ix. 158; *A. Cunn. Precur.* n. 194; *Raoul, Choix*, 38. *C. novæ-zealandiæ*, *Spreng. Crypt.* 115; *Raoul, Choix*, 38. *Darea flaccida*, *Willd. Sp. Plant.* v. 296.

Var. Shuttleworthianum.—Fronds broader and much more compound, 1-2 ft. long, 4-10 in. broad, ovate-oblong, acuminate, very coriaceous, dark-green, 3-4-pinnatifid; ultimate segments linear-spathulate; sori short, oblong, quite marginal.—*Hook. f. Hanib. N.Z. Fl.* 374. *A. Shuttleworthianum*, *Kunze in Schkr. Fil. Suppl.* 26, t. 14; *Hook. Sp. Fil.* iii. 210.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Abundant throughout. Sea-level to 3500 ft. **Var. Shuttleworthianum:** Kermadec Islands, abundant, *MacGillivray, T. F. C.*

Also found in Australia and Tasmania, in several of the Pacific islands, and said to have been gathered in South Africa. In New Zealand it varies excessively, the varieties depending to a large extent on the nature of their habitat, specimens growing on trees in damp forests being long and narrow and pendulous, while those found on exposed rocks are broad, rigid, and erect. Sir J. D. Hooker makes 5 varieties in the Handbook, exclusive of var. *Shuttleworthianum*, but they are so intimately connected by intermediate forms that it is difficult to provide them with satisfactory definitions.

11. **A. umbrosum**, *J. Sm. in Hook. Lond. Journ. Bot.* iv. (1845) 174.—Rhizome short, stout. Stipes 1-2 ft. long, stout, erect, scaly towards the base, smooth and naked above, brownish-green. Fronds variable in size, 1-4 ft. long without the stipes, 9 in. to 3 ft. broad, broadly ovate or deltoid, spreading, often drooping towards the tip, pale-green, membranous, flaccid, 2-3-pinnate; rhachis slender, flexuous, naked. Primary pinnæ rather distant, 6-18 in. long, ovate-lanceolate to oblong-ovate, acute or acuminate; secondary 1-2 in. long, lanceolate, deeply pinnatifid or again pinnate. Ultimate segments $\frac{1}{4}$ - $\frac{1}{2}$ in. long, oblong or oblong-lanceolate, acute, sessile and decurrent, usually deeply inciso-crenate; veins pinnate, simple or forked. Sori copious, usually about 5-6 to each pinnule, short, oblong. Indusium large, tumid, membranous.—*Hook. and Bak. Syn. Fil.* 229; *Benth. Fl. Austral.* vii. 749; *Thoms. N.Z. Ferns*, 77; *Field, N.Z. Ferns*, 125, t. 5, f. 2. *A. australe*, *Brack. Fil. U.S. Expl.*

Exped. 173; *Hook. Sp. Fil.* iii. 232; *Hook. f. Handb. N.Z. Fl.* 374. *A. Brownii*, *J. Sm. ex Hook. f. Fl. Nov. Zel.* ii. 36; *Hook. Ic. Plant.* t. 978. *Athyrium umbrosum*, *Presl. Pterid.* 98. *A. australe*, *Presl. l.c.* *Allantodia australis*, *R. Br. Prodr.* 149. *A. tenera*, *R. Br. l.c.*; *A. Cunn. Precur.* n. 186; *Raoul, Choix*, 37.

NORTH ISLAND: Not uncommon from the Bay of Islands to the East Cape and Taranaki, from thence somewhat rare and local to Cook Strait, usually on calcareous or alluvial soils. SOUTH ISLAND: Nelson—*Travers*; near Foxhill, *T. F. C.*; West Wanganui, *Kingsley*. Sea-level to 1800 ft.

Also found in Australia and Tasmania, the Malay Archipelago, India, tropical Africa to the Canary Islands, the Azores, and Madeira.

12. ***A. japonicum***, *Thunb. Fl. Jap.* 334. — Rhizome long, slender, creeping, branched, densely scaly at the tip. Stipes 3–9 in. long, slender, pale-brown or straw-coloured, scaly when young, especially near the base. Fronds 6–12 in. long without the stipes, $2\frac{1}{2}$ –5 in. broad, ovate-lanceolate, long-acuminate, pale-green, thin and membranous, glabrous on both surfaces or sprinkled with a few weak hairs, pinnate below, pinnatifid towards the apex; rhachis slender, slightly scaly. Pinnæ spreading, rather distant, $1\frac{1}{2}$ –3 in. long, lanceolate, acuminate, deeply pinnatifid; lobes about $\frac{1}{3}$ in. long, close, oblong, obtuse, slightly toothed or nearly entire. Veins pinnate in the lobes; veinlets 4–6 on each side, simple or forked. Sori linear-oblong, usually occupying all the veinlets, reaching two-thirds of the distance from the midrib to the margin, the lowest one in each lobe usually diplaziod. — *Hook. and Bak. Syn. Fil.* 234; *Benth. Fl. Austral.* vii. 750; *Cheesem. in Trans. N.Z. Inst.* xxii. (1890) 448. *A. Schkuhrii*, *Hook. Sp. Fil.* iii. 251. *Diplazium congruum*, *Brack. Fil. U.S. Expl. Exped.* 141, t. 18; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 178.

KERMADEC ISLANDS: Ravines on Sunday Island, not common, *T. F. C.* NORTH ISLAND: Auckland—Banks of the Awanui River (near Kaitaia), *R. H. Matthews*! *H. Carse*! Okura River (Bay of Islands), *Miss Clarke*! Northern Wairoa River, *G. E. Smith*!

This appears to be a widely distributed species, ranging through Polynesia to the Malay Archipelago, India, China, and Japan. It is possible that Mr. Kirk's *A. umbrosum* var. *tenuifolium* (*Trans. N.Z. Inst.* xxiii. 424), of which I have seen no specimens, may be identical with it.

19. **ASPIDIUM**, Swartz.

Rhizome short and erect or ascending, or long and creeping. Fronds tufted at the top of the rhizome or more or less distant along it, very variable in size cutting and venation, 2–3-pinnate or pinnate; coriaceous, more rarely submembranous; veins free in all the New Zealand species. Sori globose, dorsal, placed on the back or at the tip of a vein, or at the junction of two veins. Indusium

orbicular, attached by a central stalk, flat or convex, membranous, concealing the sorus when young. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

A genus of about 70 species, found in most parts of the world. The New Zealand species all belong to the subgenus *Polystichum*, characterized by the free veins, coriaceous habit, and usually sharply toothed segments. Of the 7 species enumerated in this work, 3 are very widely distributed, 1 is American and antarctic, another extends to Fiji, the remaining 2 are endemic.

A. Rhizome short, stout, erect. Fronds tufted at the top of the rhizome.

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| Fronds 1-3 ft., oblong-lanceolate, coriaceous, narrowed below, 2-pinnate; segments sharply toothed. Stipes shaggy with large dark scales mixed with hairs .. | 1. <i>A. aculeatum</i> |
| Fronds 4-8 in., oblong-lanceolate, coriaceous, pinnate; segments obtusely toothed. Stipes clothed with blackish-brown scales | 2. <i>A. mohrioides</i> . |
| Fronds 9-18 in., ovate-deltoid, rigid and coriaceous, not narrowed below, 1-2 pinnate; segments sharply toothed. Stipes clothed with narrow black scales | 3. <i>A. Richardi</i> . |
| Fronds 10-20 in., ovate-oblong, coriaceous, not narrowed below, 2-3 pinnate; segments obtusely toothed. Stipes clothed with large black scales margined with white. Indusium with a large black disc | 4. <i>A. oculatum</i> . |
| Fronds 4-12 in., oblong-lanceolate, soft and flaccid, 2-pinnate. Stipes clothed with large pale membranous scales. Indusium large, very convex | 5. <i>A. cystostegia</i> . |

B. Rhizome long, creeping. Fronds distant along the rhizome.

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| Fronds 1-3 ft., deltoid, 2-3-pinnate. Ultimate segments obtusely lobed or toothed | 6. <i>A. capense</i> . |
| Fronds 1-3 ft., deltoid, 2-3-pinnate. Ultimate segments with aristate teeth or lobes | 7. <i>A. aristatum</i> . |

1. ***A. aculeatum***, Swartz in Schrad. Journ. ii. (1800) 37; var. ***vestitum***, Hook. f. Handb. N.Z. Fl. 375.—Rhizome short, stout, erect or ascending, sometimes produced into an erect caudex 1-4 ft. high. Stipes 6-18 in. long, stout, erect, densely clothed with spreading scales; many of the scales large, over 1 in. long, ovate-lanceolate or subulate-lanceolate, long-acuminate, lacerate, straight or curved, glossy, black or dark-brown with a pale margin; others bristle-like or woolly, pale-ferruginous or tawny. Fronds numerous, forming a spreading crown at the top of the caudex, 1-3 ft. long without the stipes, 4-9 in. broad, oblong-lanceolate or linear-oblong, acute or acuminate, narrowed towards the base, rather coriaceous, dark-green, glabrous above when mature, under-surface more or less fibrillose, bipinnate; rhachis usually densely scaly like the stipes, but sometimes the broader scales are wanting. Primary pinnæ numerous, close-set, horizontally spreading, 2-5 in. long, $\frac{1}{2}$ -1 in. broad, linear-lanceolate or lanceolate, acuminate. Pinnules numerous, close, shortly stipitate, ovate-rhomboidal, unequal-sided, more or less auricled on the upper side near the base, toothed or lobed or pinnatifid, the lobes acute or pungent. Sori 6-8 to a

pinnule, in 2 rows nearer the midrib than the margin. Indusium rather small, flat, orbicular.—*Hook. Sp. Fil.* iv. 22; *Hook. and Bak. Syn. Fil.* 252; *Thoms. N.Z. Ferns*, 78; *Field, N.Z. Ferns*, 126, t. 8, f. 2. *A. vestitum*, *Swartz, Syn. Fil.* 53, 254; *A. Rich. Fl. Nouv. Zel.* 68; *A. Cunn. Precur.* n. 218; *Raoul, Choix*, 38. *A. proliferum*, *R. Br. Prodr.* 147; *A. Rich. Fl. Nouv. Zel.* 69; *A. Cunn. Precur.* n. 220. *A. pulcherrimum* and *A. Waikarense*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 6, 7. *A. perelegans* and *A. zerophyllum*, *Col. in Trans. N.Z. Inst.* xxix. (1897) 416, 418. *Polystichum vestitum*, *Presl. Pteridogr.* 177; *Hook. f. Fl. Nov. Zel.* ii. 38; *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 4, f. S. *P. venustum*, *Homb. and Jacq. l.c.* t. 5, f. N.; *Hook. f. Fl. Antarct.* i. 106. *Polypodium vestitum*, *Forst. Prodr.* n. 445.

Var. *sylvaticum*.—Smaller and much more slender. Fronds few, 12-24 in. long including the stipes, not so coriaceous. Pinnæ fewer, more remote; pinnules more distinctly stipitate, narrower, ovate-lanceolate, pinnatifid; segments spinulose. Sori 6-8 to a pinnule; indusium not developed. *Polypodium sylvaticum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 3; *Hook. f. Fl. Nov. Zel.* ii. 41, t. 81; *Handb. N.Z. Fl.* 380; *Hook. Sp. Fil.* iv. 249.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, MACQUARIE ISLAND: Rather local from Cape Colville to the East Cape, not uncommon in hilly districts from thence to Wellington, abundant to the south of Cook Strait. Sea-level to 3500 ft.

A. aculeatum, in some of its forms, is found in almost all parts of the world. The New Zealand variety, which is mainly distinguished by the copious large dark-coloured scales, which usually clothe not only the stipes but also the rhachis up to its tip, is also found in Australia, Tasmania, and Fuegia. It varies greatly in the size, shape, and texture of the frond, in the shape of the pinnules and the extent to which they are toothed or lobed, and in many other respects. The fronds are often bifid or crested at the tip, and are sometimes proliferous.

2. ***A. mohrioides***, *Bory. Voy. Duper. Crypt.* 267, t. 35.—Rhizome short, stout, erect or oblique, densely clothed with blackish-brown glossy scales. Stipes stout, 2-6 in. long, more or less densely scaly. Fronds tufted at the top of the rhizome, 4-8 in. long, 1-3 in. broad, oblong-lanceolate, subacute, coriaceous, pinnate; rhachis stout, compressed, scaly. Pinnæ numerous, close-set and often imbricating, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. long, ovate or ovate-lanceolate, pinnatifid above, pinnate toward the base. Pinnules about $\frac{1}{4}$ in. long, ovate or ovate-oblong, obtuse, slightly toothed; teeth obtuse or shortly mucronate. Sori copious, in 2 rows in the pinnules, often confluent when old. Indusium orbicular, dark-brown.—*Hook. f. Fl. Antarct.* ii. 392, t. 149; *Hook. Sp. Fil.* iv. 26; *Hook. and Bak. Syn. Fil.* 252; *Kirk in Trans. N.Z. Inst.* xiv. (1882) 386.

AUCKLAND ISLANDS: *Kirk*.

I have seen no specimens of this from the New Zealand area, and Mr. Kirk's notice in the *Trans. N.Z. Inst.*, quoted above, is the only authority for including the species in the Flora. But as it occurs in Chili, Fuegia, the Falkland Islands, Prince Edward Island, and Marion Island, its existence in the Auckland and Campbell Islands may naturally be expected.

3. **A. Richardi**, *Hook. Sp. Fil.* iv. 23, t. 222.—Rhizome short, thick, densely clothed with linear-subulate dark-brown or blackish scales. Stipes 6–18 in. long, stout, erect, more or less clothed with rigid black subulate deciduous scales mixed with woolly hairs. Fronds few, tufted at the top of the rhizome, 9–18 in. long or more without the stipes, 3–9 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, not narrowed at the base, rigid and coriaceous, glabrous above, more or less woolly or furfuraceous beneath, pinnate or 2-pinnate; rhachis often scaly and woolly like the stipes, but usually less conspicuously so. Pinnæ numerous, usually close and compact, but sometimes a little remote, spreading, $\frac{1}{2}$ –4 in. long, $\frac{3}{4}$ –1½ in. broad, lanceolate or ovate-lanceolate, deeply pinnatifid or again pinnate. Pinnules numerous, close, lanceolate or ovate-lanceolate or ovate-oblong, acute or mucronate or pungent, usually more or less acutely serrate, but sometimes the teeth are obtuse or very obscure. Sori in two rows in each pinnule, about half-way between the midrib and the margin. Indusium orbicular, flat, with a rather large dark disc and pale margin.—*Handb. N.Z. Fl.* 375; *Hook. and Bak. Syn. Fil.* 253; *Thoms. N.Z. Ferns*, 79; *Field, N.Z. Ferns*, 128, t. 13, f. 4. *A. coriaceum* var. *acutidentatum*, *A. Rich. Fl. Nouv. Zel.* 71. *Polystichum aristatum*, *Hook. f. Fl. Nov. Zel.* ii. 37, t. 78 (*not of Presl.*). *Polystichum Richardi*, *Diels.*

NORTH AND SOUTH ISLANDS: From the North Cape to the south of Otago, not uncommon in lowland districts, especially near the sea.

Also in Fiji. A variable plant, especially in the extent to which the pinnæ are divided, and in the shape and toothing of the pinnules.

4. **A. oculatum**, *Hook. Sp. Fil.* iv. 24, t. 228.—“Rhizome absent. Fronds 10–20 in. long, coriaceous, ovate-oblong, acuminate, 3-pinnate, pale and clothed with woolly hairs below; stipes stout, straw-coloured, covered with rigid, large, subulate, brown scales margined with white; rhachis with fewer softer scales and lax woolly hairs; primary divisions of the frond 2–4 in. long, narrow ovate-lanceolate, acuminate, stalked, not close together; secondary also lax, $\frac{2}{3}$ –1 in. long, sessile or stalked; pinnules alternate, sessile, decurrent, $\frac{1}{4}$ in. long, obtuse or mucronate, obtusely toothed or subpinnatifid. Sori abundant over the whole under-surface, 2–4 on each segment; involucre orbicular, shortly stalked, with a large black disc and narrow reddish margin.”—*Hook. f. Handb. N.Z. Fl.* 376; *Hook. and Bak. Syn. Fil.* 253; *Thoms. N.Z. Ferns*, 79; *Field, N.Z. Ferns*, 129.

NORTH AND SOUTH ISLANDS: “Wairarapa Valley, Colenso; Akaroa, Raoul” (*Handbook*).

I have not identified this with certainty, and have consequently reproduced the description given in the *Handbook*. It is probably nothing more than a trivial variety of *A. Richardi* with a rather laxer frond than usual, and smaller and shorter pinnules with more obtuse teeth. Mr. Baker keeps it as a distinct species in the “*Synopsis Filicum*,” but in the “*Annals of Botany*” (Vol. v., 314) he remarks that it is evidently a mere variety of *A. Richardi*.

5. **A. cystostegia**, *Hook. Sp. Fil.* iv. 26, t. 227.—Rhizome short, stout, densely scaly, sometimes branched above. Stipes 2–6 in. high, pale-brown, clothed with copious large pale-brown shining membranous lanceolate scales. Fronds very numerous, tufted at the top of the rhizome, 4–10 in. long without the stipes, $1\frac{1}{2}$ –2 in. broad, oblong-lanceolate, acute, pale-green, soft, membranous and almost flaccid, both surfaces clothed with linear scales when young, 2-pinnate; rhachis stout, densely scaly. Pinnæ spreading, closely placed above the middle, remote below, $\frac{1}{2}$ – $1\frac{1}{2}$ in. long, ovate-deltoid, pinnate; rhachises often winged. Pinnules $\frac{1}{4}$ – $\frac{1}{3}$ in. long, ovate-lanceolate, deeply lobed or pinnatifid; segments obtuse or acute. Sori numerous, large, 2–4 to a pinnule. Indusium orbicular, very convex, almost hemispherical, thin and membranous, pale-coloured.—*Hook. f. Handb. N.Z. Fl.* 376; *Hook. and Bak. Syn. Fil.* 253; *Thoms. N.Z. Ferns*, 79; *Field, N.Z. Ferns*, 128, t. 8, f. 3.

NORTH ISLAND: Tongariro, *Dieffenbach*; Mount Egmont, *Mrs. Jones, T. F. C.*; Tararua Mountains, *Buchanan*. SOUTH ISLAND: Not uncommon in alpine districts throughout. AUCKLAND ISLANDS: *Kirk*. 3000–5500 ft.

A very distinct little species, easily recognised by the stout soft stipes and rhachis densely clothed with large pale scales, the narrow frond, and large bladdery indusia. A form with a firmer frond and dark-coloured scales on the stipes is occasionally seen.

6. **A. capense**, *Willd. Sp. Plant.* v. 268.—Rhizome long, stout, creeping, covered with large tawny subulate-lanceolate silky scales. Stipes 1–2 ft. long, stout, erect, more or less densely clothed with deciduous scales. Fronds scattered along the rhizome, 9–18 in. long without the stipes, 6–12 in. broad, ovate-deltoid, acuminate, very coriaceous, rigid, glabrous or the under-surface slightly paleaceous, 3-pinnate; rhachis deciduously scaly. Primary pinnæ erectopatent, stipitate, lanceolate or lanceolate-deltoid, 2-pinnate; the lowest pair the largest, 4–8 in. long, 2–3 in. broad, the basal secondary pinna on each side of the frond longer than the others. Ultimate segments oblong, obtuse or subacute, shortly and bluntly lobed or almost entire, not mucronate. Sori copious, in 2 rows near the midrib, often covering the whole under-surface. Indusium large, orbicular, sometimes with a distinct sinus.—*Hook. and Bak. Syn. Fil.* 254; *Benth. Fl. Austral.* vii. 758; *Thoms. N.Z. Ferns*, 80; *Field, N.Z. Ferns*, 129, t. 6, f. 2. *A. coriaceum*, *Swartz, Syn. Fil.* 57; *A. Rich. Fl. Nouv. Zel.* 71; *A. Cunn. Precur.* n. 223; *Raoul, Choix*, 38; *Hook. Sp. Fil.* iv. 32; *Hook. f. Handb. N.Z. Fl.* 376. *A. Cunninghamianum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 6. *Polystichum coriaceum*, *Schott*; *Hook. f. Fl. Nov. Zel.* ii. 37. *Polypodium adiantiforme*, *Forst. Prodr.* n. 449.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in forests throughout, often climbing up trees. Sea-level to 2000 ft.

A widely distributed fern, found in temperate Australia, Polynesia, South Africa, Mauritius, and in America stretching from Cuba to Patagonia.

7. **A. aristatum**, Swartz, *Syn. Fil.* 53.—Rhizome long, stout, creeping, clothed with linear-subulate ferruginous scales. Stipes 9–18 in. long, stout, densely clothed towards the base with linear fibrillose scales. Fronds scattered, 1–2 ft. long by 9–12 in. broad, ovate-deltoid, acuminate, coriaceous, dark-green and glossy, both surfaces naked, 3-pinnate; rhachis glabrous or sparingly paleaceous. Primary pinnæ stipitate, lanceolate, acuminate, pinnate or 2-pinnate; the lowest pair the longest, 6–9 in. long, lanceolate-deltoid, with an elongated basal pinnule. Pinnules obliquely ovate-lanceolate or narrow ovate-rhomboid, irregularly dentate with the teeth ending in bristle-like points. Sori rather small, in 2 rows near the midrib. Indusium smooth, flat, orbicular or rarely slightly reniform.—*Hook. Sp. Fil.* iv. 27; *Hook. f. Handb. N.Z. Fl.* 376; *Hook. and Bak. Syn. Fil.* 255; *Benth. Fl. Austral.* vii. 757; *Thoms. N.Z. Ferns*, 80. *Polystichum aristatum*, Presl. *Tent. Pterid.* 83 (not of *Hook. f. Fl. Nov. Zel.* ii. 37). *Polypodium aristatum*, Forst. *Prodr.* n. 448.

KERMADEC ISLANDS: Sunday Island, abundant, *MacGillivray, T. F. C.*

A most abundant Polynesian plant, also found in tropical Australia, Malaya, India, China, Japan, and South Africa.

20. **NEPHRODIUM**, Rich.

Rhizome short and tufted or long and creeping. Fronds crowded at the top of the rhizome or scattered along it, very various in size and form, frequently pinnate with the pinnæ pinnatifid, or 2–3-pinnate or decompound. Veins all free, or the lower veinlets in a lobe united by their tips to those of the adjoining lobes, or (in species not found in New Zealand) copiously anastomosing. Sori subglobose, dorsal, placed on the back or at the tip of a vein. Indusium cordate or reniform, attached by the sinus, membranous, concealing the sorus when young. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

Understood in the sense of the “Synopsis Filicum,” this is the largest genus of ferns after *Polypodium*, including over 400 species, and quite cosmopolitan in its distribution. Of the 8 species found in New Zealand, 6 are widely spread, 1 extends to Australia alone, the remaining 1 appears to be endemic.

Subgenus I. LASTREA. Veins and veinlets all free.

* Fronds lanceolate or linear-oblong, pinnate with the pinnæ pinnatifid.

Rhizome long, creeping. Fronds 6–12 in. long, membranous, glabrous except a few scales on the under-surface of the rhachis and costæ 1. *N. Thelypteris*.

** Fronds broadly ovate or deltoid, 2–3-pinnate or decompound.

Rhizome long, creeping. Fronds 9–18 in., pale-green, finely pubescent. Stipes pubescent 2. *N. decompositum*.
Rhizome short, tufted. Fronds 6–14 in., dark-green, glabrous except the rhachis and costæ. Stipes nearly glabrous 3. *N. glabellum*.

- Rhizome short, tufted. Fronds 9–18 in., reddish-brown, both surfaces clothed with short velvety pubescence .. 4. *N. velutinum*.
 Rhizome short. Fronds 1–3 ft., ovate or ovate-lanceolate, pale-green, membranous; rhachises and under-surface with fine spreading hairs .. 5. *N. setigerum*.
 Rhizome long, stout, creeping. Fronds 1–2 ft., ovate-deltoid, coriaceous, finely 2–4-pinnate. Stipes and rhachis densely hispid with rigid linear bristles .. 6. *N. hispidum*.

Subgenus II. EUNEPHRODIUM. Veins in regular pinnate groups, the lower veinlets of each group united at the tips with those of the adjoining groups.

- Rhizome long, creeping. Fronds 6–18 in., rather rigid; lower pinnæ not reduced in size .. 7. *N. unitum*.
 Rhizome short. Fronds 1–3 ft., soft and membranous, finely pilose; lower pinnæ gradually reduced in size .. 8. *N. molle*.

1. *N. Thelypteris*, Desv. in *Mém. Soc. Linn.* vi. 257; var. *squamulosum*, Schlecht. *Fil. Cop.* 23, t. 11. — Rhizome long, slender, creeping, branched. Stipes 4–12 in. long, slender, straw-coloured, darker at the base, smooth, naked or slightly scaly when young. Fronds scattered along the rhizome, 6–12 in. long without the stipes, rarely more, 2–5 in. broad, linear-oblong or lanceolate, acuminate, truncate at the base, pale-green, membranous, glabrous except the costæ and rhachis which are sparsely clothed beneath with pale broad convex scales, pinnate. Pinnæ opposite or nearly so, 1–2½ in. long, ⅓–½ in. broad, linear-oblong, deeply pinnatifid. Segments ⅙–¼ in. long, oblong, obtuse or subacute, quite entire, broader and flatter in the sterile frond than in the fertile. Veins free, the lower or nearly all forked. Sori numerous, small, in two rows, rather nearer the recurved margin than the midrib. Indusium cordate-reniform, glandular-ciliate. — *Hook. Sp. Fil.* iv. 88; *Handb. N.Z. Fl.* 377; *Hook. and Bak. Syn. Fil.* 271; *Thoms. N.Z. Ferns*, 81; *Field, N.Z. Ferns*, 130, t. 13, f. 3. *N. squamulosum*, *Hook. f. Fl. Nov. Zel.* ii. 39.

NORTH ISLAND: Marshes from the North Cape to the East Cape, Taupo, Whanganui, and Otaki, but often local. Sea-level to 2000 ft.

The typical form of the species is found in Europe, north Asia, the Himalayas, and North America; the var. *squamulosum*, which differs chiefly in the scales on the under-side of the rhachis and costæ, appears to be confined to New Zealand and South Africa.

2. *N. decompositum*, *R. Br. Prodr.* 149. — Rhizome long, slender, creeping, branched, more or less clothed with chaffy scales. Stipes 6–18 in. long, firm, erect, scaly towards the base, villous-pubescent above. Fronds scattered along the rhizome, not tufted, 9–18 in. long without the stipes, often almost as broad, ovate-deltoid or pentangular, acuminate, membranous or sub-coriaceous, pale-green, more or less finely villous or pubescent, 2-pinnate above, 3-pinnate below; rhachis and costæ slender, villous-pubescent. Primary pinnæ 4–9 in. long; the lowest pair

much the largest, unequally deltoid with the basal secondary pinna on each side much longer than the rest; upper pinnae gradually smaller, ovate-lanceolate. Secondary pinnae lanceolate, deeply pinnatifid or the lower again pinnate; ultimate segments close, unequal-sided, ovate-rhomboid to lanceolate-rhomboid, acutely toothed or lobed. Sori rather large, distant, nearer the margin than the midrib. Indusium orbicular-reniform.—*Hook. f. Fl. Nov. Zel.* ii. 39, t. 79; *Handb. N.Z. Fl.* 378; *Hook. Sp. Fil.* iv. 146; *Hook. and Bak. Syn. Fil.* 281; *Thoms. N.Z. Ferns*, 82; *Field, N.Z. Ferns*, 131, t. 5, f. 7. *N. pentangularum*, *Col. in. Tasmanian Journ. Nat. Sci.* (1845) 9. *Aspidium decompositum*, *Spreng. Syst.* iv. 109; *Benth. Fl. Austral.* vii. 758.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Not uncommon in lowland districts, usually in rich alluvial soils. Sea-level to 1200 ft.

An abundant Australian plant, ranging from the north of Queensland to Tasmania, also in Norfolk Island.

3. ***N. glabellum***, *A. Cunn. Precur.* n. 224.—Rhizome short, stout, tufted, clothed with the bases of the old stipites intermixed with subulate scales. Stipes 4–10 in. long, slender, firm, scaly at the base, glabrous or nearly so above. Fronds tufted at the top of the rhizome, 6–14 in. long or more without the stipes, 4–10 in. broad, ovate-deltoid, acuminate, membranous but firm, dark-green, 2–3-pinnate; surfaces almost glabrous except the rhachis and costæ, which are more or less clothed with short reddish pubescence. Primary pinnae 2–5 in. long; the lowest pair the largest, deltoid, not so unequal-sided as in *N. decompositum*, and the basal secondary pinnae not conspicuously longer than the rest; upper pinnae lanceolate, acuminate; secondary rhachises margined throughout. Secondary pinnae obliquely ovate-lanceolate or lanceolate, deeply pinnatifid or the lower again pinnate; ultimate segments ovate or oblong, sharply toothed or lobed. Sori distant, about half-way between the margin and the midrib. Indusium pale, orbicular-reniform.—*Raoul, Choix*, 38; *Kirk in Trans. N.Z. Inst.* x. (1878) 398; *Thoms. N.Z. Ferns*, 82; *Field, N.Z. Ferns*, 131, t. 6, f. 3. *N. decompositum* var. *pubescens*, *Hook. f. Fl. Nov. Zel.* ii. 39. *N. decompositum* var. *microphyllum*, *Hook. Sp. Fil.* iv. 146. *N. decompositum* var. *glabellum*, *Hook. and Bak. Syn. Fil.* 281.

NORTH AND SOUTH ISLANDS: In dry woods from the North Cape to Foveaux Strait, not uncommon. Sea-level to 1500 ft.

Also in Australia and several of the Polynesian islands. Closely allied to *N. decompositum*, but sufficiently distinct in the short (not creeping) rhizome, the nearly glabrous stipes, the smaller dark-green and glossy tufted fronds, with a narrower outline, and with the surfaces glabrous except a reddish pubescence on the rhachis and costæ.

4. **N. velutinum**, *Hook. f. Fl. Nov. Zel.* ii. 39, t. 80.—Rhizome short, stout, erect. Stipes 9–18 in. long, firm, erect, densely villose-pubescent above, clothed at the base with large red-brown subulate scales. Fronds tufted at the top of the rhizome, 9–18 in. long, almost the same in breadth, broadly deltoid or pentangular, acuminate, reddish-brown, soft and membranous, clothed on both surfaces with copious short silky hairs, 2–3-pinnate or in large specimens 4-pinnate at the base; rhachises densely silky. Lower primary pinnæ much the largest, 6–12 in. long, deltoid, the lowest secondary pinna much longer than the rest and deflexed; upper pinnæ gradually smaller, oblong-deltoid to lanceolate-deltoid, acuminate. Secondary pinnæ close, numerous, lanceolate, deeply pinnatifid or again pinnate. Pinnules oblong-ovate or oblong, obtuse, deeply obtusely lobed or pinnatifid. Sori rather small, copious; indusium pubescent, often glandular.—*Handb. N.Z. Fl.* 378; *Hook. Sp. Fil.* iii. 145; *Hook. and Bak. Syn. Fil.* 281; *Thoms. N.Z. Ferns*, 83; *Field, N.Z. Ferns*, 132, t. 20, f. 2. *Aspidium velutinum*, *A. Rich. Fl. Nouv. Zel.* 70; *A. Cunn. Precur.* n. 222; *Raoul, Choix*, 38.

NORTH AND SOUTH ISLANDS: Dry woods from the North Cape to Otago, but rather local in the South Island. Sea-level to 1000 ft.

Allied to *N. decompositum*, but easily separated by the more membranous and flaccid reddish-brown fronds, densely clothed with a short velvety pubescence. Apparently confined to New Zealand.

5. **N. setigerum**, *Bak. Syn. Fil.* 284.—Rhizome short. Stipes 1–2 ft. long or more, firm, erect, straw-coloured, slightly paleaceous at the base, smooth and glabrous above. Fronds tufted, 1–3 ft. long, 9–18 in. broad, ovate or ovate-lanceolate, acuminate, pale-green, membranous, 2–3-pinnate; main rhachis stramineous, naked towards the base, densely clothed with fibrillose hairs above, as are the secondary rhachises; under-surface of frond and veins hispid with long white spreading needle-like hairs. Lower primary pinnæ 9–12 in. long, ovate-lanceolate, acuminate, the upper gradually smaller and narrower; secondary pinnæ lanceolate, deeply pinnatifid or again pinnate. Pinnules $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear-oblong, obtuse, deeply lobed or pinnatifid, the margins usually recurved. Sori small, copious, 6–10 to a pinnule. Indusium small, soon deciduous.—*N. tenericaule*, *Hook. Sp. Fil.* iv. 142, t. 269; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 178.

KERMADEC ISLANDS: Ravines on the north side of Sunday Island, not uncommon, *T. F. C.*

Abundant throughout Polynesia, and ranging from tropical Australia to Malaya, India, China, and Japan.

6. **N. hispidum**, *Hook. Sp. Fil.* iv. 150.—Rhizome long, stout, creeping, densely clothed with subulate red-brown scales. Stipes 9–18 in. long, stout, erect, brown, everywhere hispid with long

rigid linear spreading bristles with a swollen base. Fronds 9–18 in. long or more, 6–12 in. broad, broadly ovate or triangular, acuminate, brownish-green, coriaceous, 3–4-pinnate; primary and secondary rhachises bristly like the stipes. Primary pinnæ 3–8 in. long, ovate-lanceolate or the lowest deltoid, acuminate, the lowest pinnule larger than the others. Secondary pinnæ oblong-lanceolate, again 1- or 2-pinnate. Pinnules $\frac{1}{4}$ – $\frac{1}{2}$ in. long, narrow-lanceolate, acute, deeply and acutely toothed or almost pinnatifid, the teeth often pungent. Sori large, copious, one to each of the ultimate segments or lobes. Indusium orbicular with an indistinct sinus, flat, brown.—*Hook. f. Handb. N.Z. Fl.* 378; *Hook. and Bak. Syn. Fil.* 286; *Benth. Fl. Austral.* vii. 760; *Thoms. N.Z. Ferns*, 83; *Field, N.Z. Ferns*, 132, t. 3, f. 3. *Aspidium hispidum*, *Swartz, Syn. Fil.* 56; *A. Rich. Fl. Nouv. Zel.* 69; *A. Cunn. Precur.* n. 221; *Racoul, Choix*, 38. *Polystichum hispidum*, *J. Sm. Gen. Ferns*, 83; *Hook. f. Fl. Nov. Zel.* ii. 38. *Polypodium setosum*, *Forst. Prodr.* n. 447.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in forests throughout. Sea-level to 2000 ft.

A very distinct species, at once recognised by the finely divided frond and the numerous stiff spreading bristles on the stipes and rhachis. It is also found in Victoria, where, however, it is rare and local.

7. **N. unitum**, *R. Br. Prodr.* 148.—Rhizome long, stout, creeping, sparingly clothed with blackish-brown scales. Stipes 6–14 in. long, smooth, erect, almost black at the base, brownish above, naked or with a few chaffy scales. Fronds 6–18 in. long without the stipes, 3–9 in. broad, oblong or ovate-oblong, acuminate, somewhat rigid, coriaceous, glabrous, pinnate; rhachis smooth, naked. Pinnæ 9–15 pairs, subopposite, ascending or spreading, the lower ones not reduced in size, 2–5 in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, linear-lanceolate, pinnatifid from $\frac{1}{3}$ to $\frac{1}{2}$ the way to the midrib; lobes spreading, ovate or ovate-triangular, subacute or obtuse, entire or nearly so. Veins pinnate in each lobe; veinlets 6–8 on each side, the lower ones united at the tips with those of the adjoining lobes. Sori copious, nearer the margin than the midrib, mostly placed in the lobes, but usually extending below them as well.—*Hook. f. Handb. N.Z. Fl.* 749; *Hook. and Bak. Syn. Fil.* 289; *Thoms. N.Z. Ferns*, 83; *Field, N.Z. Ferns*, 134, t. 23, f. 1. *N. inæquilaterum*, *Col. in Trans. N.Z. Inst.* xx. (1888) 229. *Aspidium unitum*, *Swartz, Syn. Fil.* 47; *Benth. Fl. Austral.* vii. 755.

NORTH ISLAND: Swamps in the North Cape district, at Houhoura, Waibi, Rangaunu Harbour, Ahipara, &c., *J. B. Simpson!* *R. H. Matthews!* *T. F. C.*; hot springs at Miranda, Thames, *J. Adams!* hot-water swamps in the Thermal-springs district, not uncommon from Maketu and Rotorua to Waitapu, Roto-kawa, Wairakei, and Tokaanu, *Captain G. Mair!* *Kirk!* *T. F. C.*, *Norton!* *Field, &c.* Sea-level to 1800 ft.

An abundant fern in most tropical and warm-temperate countries.

8. **N. molle**, *Desv. in Mem. Linn. Soc.* vi. 258.—Rhizome very shortly creeping or tufted and erect, densely rooting. Stipes 9–24 in. long, slender, greenish, naked or pubescent with soft spreading hairs. Fronds 1–3 ft. long, 6–12 in. broad, oblong-lanceolate, acuminate, gradually narrowed at the base, pale-green, membranous and flaccid, sparingly pilose on both surfaces or almost glabrous when old, pinnate; rhachis pale, pilose with spreading hairs. Pinnæ numerous, the lower ones gradually dwarfed, spreading, sessile, 3–6 in. long, about $\frac{3}{4}$ in. broad, lanceolate, acuminate, pinnatifid about half-way to the midrib; lobes short, oblong, obtuse, entire or nearly so. Veins pinnate in the lobes; veinlets 5–8 on each side, the lower ones uniting at the tips with those of the adjoining lobes. Sori copious, about half-way between the margin and the midrib. Indusium cordate-reniform, usually villous.—*Hook. Sp. Fil.* iv. 67; *Handb. N.Z. Fl.* 377; *Hook. and Bak. Syn. Fil.* 293; *Thoms. N.Z. Ferns*, 84; *Field, N.Z. Ferns*, 133, t. 23, f. 5. *Aspidium molle*, *Swartz, Syn. Fil.* 49; *Benth. Fl. Austral.* vii. 756. *Polypodium nymphae*, *Forst. Prodr.* 442.

KERMADEC ISLANDS: Sunday Island, not uncommon, *MacGillivray, T. F. C.* NORTH ISLAND: Auckland—North Cape district, a small patch by the side of the Mangatete Stream, flowing into Rangaunu Harbour, *R. H. Matthews!* Thermal-springs district, by the banks of the Otumakokori, or Boiling River (near Waitapu), *Captain G. Mair! T. F. C.*, *Kirk!* margins of hot springs at Wairakei (Tapu), *C. J. Norton! T. F. C.*

Abundant in tropical and warm temperate countries almost throughout the world.

21. NEPHROLEPIS, Schott.

Rhizome short and indistinct, or long and creeping, sometimes emitting long wiry creeping and rooting stolons, from which new plants originate. Fronds long and narrow, coriaceous or sub-membranous, pinnate; pinnæ jointed upon the rhachis, often deciduous, entire or crenate-serrate, upper surface frequently marked with white cretaceous dots. Veins free. Sori roundish, dorsal, placed on the tip of the upper branch of a vein, usually close to the margin. Indusium cordate or reniform or almost lunate, attached by a broad base. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

A small genus of 7 or 8 species, widely distributed in the tropical regions of both hemispheres. The two New Zealand species have the range of the genus.

Pinnæ $\frac{1}{2}$ –1 in. long, oblong or linear-oblong, obliquely cordate at the base	1. <i>N. cordifolia</i> .
Pinnæ $1\frac{1}{2}$ –3 in. long, oblong-lanceolate, usually obliquely truncate at the base	2. <i>N. exaltata</i> .

1. **N. cordifolia**, *Presl*; *Hook. and Bak. Syn. Fil.* 300.—Rhizome short, suberect or oblique, emitting numerous long and wiry scaly stolons, which root here and there and produce new plants,

sometimes bearing small scaly tubers. Stipes short, 1-4 in. long, red-brown, glossy, more or less clothed with deciduous linear scales. Fronds numerous, tufted, 1-3 ft. long, $1\frac{1}{2}$ -2 in. broad, linear-lanceolate, acuminate, pale-green, membranous, pinnate; rhachis usually shaggy with linear flexuose scales. Pinnæ very numerous, close-set, often imbricated, horizontal, $\frac{1}{2}$ -1 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, oblong or linear-oblong, obtuse or subacute, cordate at the base, the upper edge distinctly auricled, the lower shorter and rounded; margins crenate-toothed; the lower pinnæ shorter and broader and sterile. Sori in two rows on the pinnæ, rather nearer the margin than the midrib. Indusium reniform, firm, membranous.—*Thoms. N.Z. Ferns*, 85; *Field, N.Z. Ferns*, 134, t. 20, f. 3. *N. tuberosa*, *Presl*; *Hook. Sp. Fil.* iv. 151; *Hook. f. Handb. N.Z. Fl.* 379. *N. flexuosa*, *Col. in Trans. N.Z. Inst.* xx. (1888) 231. *Aspidium cordifolium*, *Swartz, Syn. Fil.* 45; *Benth. Fl. Austral.* vii. 754.

NORTH ISLAND: Auckland—Thermal-springs district, in localities heated by warm water; Otumakokori Stream (near Waiotapu), *Captain G. Mair! Kirk! T. F. C.*; Wairakei, Karapiti, and other localities at Taupo, *Hochstetter, C. J. Norton! T. F. C.*

An abundant tropical fern, extending northwards to Japan and southwards to New Zealand.

2. *N. exaltata*, *Schott; Hook. Sp. Fil.* iv. 152. — Rhizome short, indistinct, emitting numerous long wiry creeping stolons. Stipes 3-9 in. long, stout, erect, deciduously scaly. Fronds numerous, 1-3 ft. long, 4-5 in. broad, oblong-lanceolate, rather coriaceous, pinnate; rhachis and costæ and sometimes the under-surface of the pinnæ more or less scaly-tomentose or woolly. Pinnæ numerous, close-set, horizontally spreading, $1\frac{1}{2}$ -3 in. long, $\frac{1}{3}$ - $\frac{2}{3}$ in. broad, lanceolate or oblong-lanceolate, acute, broadly obliquely truncate or subcordate at the base, the upper edge slightly auricled, the lower rounded; margins crenate-serrate. Sori close to the margin, numerous, rather small. Indusium firm, almost coriaceous, distinctly reniform.—*Hook. and Bak. Syn. Fil.* 301; *Cheesem. in Trans. N.Z. Inst.* xx. (1888) 178. *Aspidium exaltatum*, *Swartz, Syn. Fil.* 45; *Benth. Fl. Austral.* vii. 754.

KERMADEC ISLANDS: Sunday Island, sandy flats in Denham Bay, not seen elsewhere, *T. F. C.*

An abundant tropical fern all round the world.

22. POLYPODIUM, Linn.

Rhizome short and suberect, or long and creeping. Stipes jointed on the rhizome or continuous with it. Fronds very various in size, shape, and cutting, simple or pinnate or 2-4-pinnate. Veins free or anastomosing. Sori globose or nearly so, placed on the back of the frond, either at the tip of a vein or on the back of one. Indusium wanting. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

As defined above, this is the largest genus of ferns, containing over 500 species, found in all parts of the world. Various attempts to divide it have been made by authors, and a multitude of small genera have been proposed, several of which appear to be well founded, but no complete arrangement of the species has yet been propounded which has met with the general approval of botanists. Of the 10 species found in New Zealand, one (*P. punctatum*) is universal in the tropics and the south temperate zone; another (*P. australe*) is common to Australia and the extreme south of South America; 6 extend to Australia or the Pacific islands; the remaining 2 are endemic.

Subgenus I. PHEGOPTERIS. Stipes not jointed on to the rhizome but continuous with it. Veins all free.

Fronds large, 1-4 ft., 2-4-pinnate, glandular-pubescent .. 1. *P. punctatum*.

Subgenus II. GONIOPTERIS. Stipes not jointed on to the rhizome but continuous with it. Veins pinnate in the lobes, the lower veinlets uniting at the tips with those of the adjoining lobes.

Fronds large, 2-5 ft., pinnate, membranous, glabrous or nearly so .. 2. *P. pennigerum*.

Subgenus III. EUPOLYPODIUM. Stipes jointed on to the rhizome. Veins all free.

Rhizome short. Fronds small, 1-6 in., quite entire. Sori oblong or linear-oblong, oblique to the midrib .. 3. *P. australe*.

Rhizome short. Fronds 3-9 in., irregularly pinnatifid or 2-pinnatifid; pinnae linear. Sori oblong or rounded .. 4. *P. grammitidis*.

Rhizome very long, creeping. Fronds 1-2 ft., pinnate; pinnae undivided, jointed on the rhachis .. 5. *P. tenellum*.

Subgenus IV. NIPHOBOLUS. Stipes jointed on to the rhizome. Veins copiously anastomosing. Under-surface of frond densely tomentose.

Rhizome long. Fronds 1-6 in., simple, entire, coriaceous; sterile shorter and broader than the fertile .. 6. *P. serpens*.

Subgenus V. PHYMATODES. Stipes jointed on to the rhizome. Veins copiously anastomosing. Under-surface of frond glabrous.

Rhizome short. Fronds 4-12 in., tufted, lanceolate, simple and entire .. 7. *P. Cunninghamii*

Rhizome long, slender, clothed with squarrose scales. Fronds 6-18 in., simple or pinnatifid, membranous; segments narrow .. 8. *P. pustulatum*.

Rhizome long, stout, clothed with appressed scales. Fronds 6-18 in., simple or pinnatifid, coriaceous; segments usually broad .. 9. *P. Billardieri*.

Rhizome long, stout, clothed with large tawny spreading scales. Fronds 1-4 ft., deeply pinnatifid or pinnate below, thinly coriaceous; segments usually narrow .. 10. *P. novae-zealandiae*.

1. *P. punctatum*, Thunb. *Fl. Jap.* 336.—Rhizome long, creeping, villous with rufous spreading hairs. Stipes 6-18 in. long, firm, erect, red-brown, densely glandular-pubescent and viscous, rough with minute raised points. Fronds scattered along the rhizome, very variable in size, from $\frac{1}{2}$ -3 ft. long, 3-18 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, rather membranous,

glandular-pubescent on both surfaces, 3-pinnate; rhachis viscid-pubescent like the stipes. Primary pinnæ in rather distant pairs, 2-10 in. long or more, 1-6 in. broad, narrow-deltoid to lanceolate, acuminate; secondary oblong or linear-oblong, acute or obtuse, deeply pinnatifid or again pinnate. Pinnules or segments oblong, crenate or angulate-dentate or pinnatifid. Veins free, once or twice forked. Sori rather large, orbicular, in 2 rows in each pinnule, close to the margin, often copious and covering the whole under-surface.—*Hook. and Bak. Syn. Fil.* 312; *Benth. Fl. Austral.* vii. 764; *Thoms. N.Z. Ferns*, 86; *Field, N.Z. Ferns*, 136, t. 15, f. 3. *P. rugulosum*, *Lab. Pl. Nov. Holl.* ii. 92, t. 241; *Hook. f. Fl. Nov. Zel.* ii. 41; *Hook. Sp. Fil.* iv. 272. *P. viscidum*, *Spreng. Sp. Plant.* iv. 61; *Hook. f. Fl. Antarct.* i. 110. *P. viscidum*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 4. *P. rufobarbatum*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 347.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS: Abundant throughout. Sea-level to 2500 ft.

With the exception of Africa, this is universally distributed throughout the tropics and the south temperate zone, advancing as far northwards as Japan. It is often confused with *Hypolepis tenuifolia*, which it much resembles in habit and in the shape of the frond. But the stipes and rhachis are markedly viscid-pubescent, the frond glandular-hairy on both surfaces, and the sori are not so close to the margin, and are not covered by a recurved lobule.

2. ***P. pennigerum***, *Forst. Prodr.* n. 444.—Rhizome stout, erect, sometimes lengthened into a short caudex 1-2 ft. high, clothed with fibrous rootlets and the bases of the old stipes. Stipes 6-12 in. long, stout, rather succulent, more or less clothed with large ovate-lanceolate brownish scales near the base, smooth and glabrous above. Fronds 2-5 ft. long, 9-18 in. broad, oblong-lanceolate, acuminate, thin and membranous, glabrous, pinnate, pinnatifid at the apex; rhachis smooth, glabrous or slightly hairy above. Pinnæ numerous, opposite or nearly so, spreading, 3-9 in. long, $\frac{1}{3}$ - $1\frac{1}{4}$ in. broad, the lower ones gradually reduced, narrow linear-oblong or linear-lanceolate, acuminate, truncate or almost auricled at the base, pinnatifid about half-way to the midrib; lobes oblong or ovate-oblong, slightly falcate, obtuse, entire or obscurely sinuate. Veins pinnate in the lobes; veinlets 6-10 on each side, the 2 lowest pairs uniting at the tips with those of the adjoining lobes. Sori one to each veinlet, forming two rows much nearer the midrib than the margin.—*Hook. f. Handb. N.Z. Fl.* 381; *Hook. Sp. Fil.* v. 7; *Hook. and Bak. Syn. Fil.* 317; *Thoms. N.Z. Ferns*, 87; *Field, N.Z. Ferns*, 137, t. 25, f. 3, and t. 26, f. 4. *P. subsimile*, *Col. in Trans. N.Z. Inst.* xx. (1888) 233. *Goniopteris pennigera*, *J. Sm. Gen. Ferns*, 18; *Hook. f. Fl. Nov. Zel.* ii. 40. *Aspidium pennigerum*, *Swartz, Syn. Fil.* 49, 250; *A. Rich. Fl. Nouv. Zel.* 67; *A. Cunn. Precur.* n. 217; *Raoul, Choix*, 38.

Var. **Hamiltoni**, *Col. in Trans. N.Z. Inst.* xiv. (1882) 338.—Smaller and more delicate, pale-green. Fronds 1-2 ft. long, 3-5 in. broad; pinnæ irregular, crisped, pinnatifid three-quarters of the way to the midrib or more; lobes coarsely and sharply irregularly dentate. Veinlets confined to the lobes, the lowest pair not meeting those of the adjoining lobes. Sori midway between the midrib and the margin. A very peculiar plant, but possibly only an abnormal state.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: From the North Cape to Foveaux Strait, abundant in woods by the side of streams, &c. Sea-level to 2000 ft. Var. *Hamiltoni*: Kereru (Hawke's Bay), *A. Hamilton*!

A very distinct species, confined to New Zealand.

3. **P. australe**, *Mett. Polyp.* 36.—Rhizome very short, or erect or oblique and lengthened to $\frac{1}{2}$ - $1\frac{1}{2}$ in. long, crowned with copious pale chestnut-brown scales; rootlets long, wiry, densely hairy; often several rhizomes and their rootlets are matted together in the same tuft. Fronds numerous, crowded towards the end of the rhizome, erect, 1-6 in. long, $\frac{1}{6}$ - $\frac{1}{3}$ in. broad, linear-lanceolate or narrow-ob lanceolate or linear-spathulate, quite entire, obtuse at the tip, very gradually narrowed into a short winged stipes, dark-green, coriaceous, glabrous or sparingly ciliate with short whitish hairs towards the base. Veins obscure, hidden in the substance of the frond. Sori in a single row on each side of the midrib and nearer to it than to the margin, oblique to the midrib, usually numerous, rather large, oblong or linear-oblong, often confluent when old.—*Hook. Sp. Fil.* iv. 167; *Hook. f. Handb. N.Z. Fl.* 380; *Hook. and Bak. Syn. Fil.* 322; *Benth. Fl. Austral.* vii. 762; *Thoms. N.Z. Ferns*, 87; *Field, N.Z. Ferns*, 138, t. 22, f. 1. *Grammitis australis*, *R. Br. Prodr.* 146; *A. Cunn. Precur.* n. 172; *Raoul, Choix*, 37; *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 2, G; *Hook. f. Fl. Antarct.* i. 111; *Fl. Nov. Zel.* ii. 44. *G. rigida* and *G. humilis*, *Homb. and Jacq. l.c.* t. 2, F, H.

Var. **villosum**, *Hook. f. Fl. Nov. Zel.* ii. 44.—Stipes, margins, and under-surface of the fronds more or less villous with long spreading rufous or whitish hairs, often partially concealing the sori.—*P. paradoxum*, *Col. in Trans. N.Z. Inst.* xiv. (1882) 336. *Grammitis ciliata*, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 6.

Var. **pumilum**, *Cheesem.*—Small, very densely matted; rhizomes stout, creeping, sometimes 1-2 in. long. Fronds $\frac{1}{2}$ - $\frac{3}{4}$ in. long, obovate or spathulate, obtuse, narrowed to the base, very thick and coriaceous, glabrous or obscurely pubescent beneath. Sori usually solitary near the tip of the frond, large, roundish.—*P. crassium*, *Kirk in Trans. N.Z. Inst.* xvii. (1885) 232. *Grammitis pumila*, *Armstr. in Trans. N.Z. Inst.* xiii. (1879) 314.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, MACQUARIE ISLAND: The typical state and var. *villosum* not uncommon throughout on rocks or trunks of trees; var. *pumilum* in mountain districts from the East Cape southwards, ascending to over 5000 ft.

A very variable little plant, also found in Australia and Tasmania, Chili, Fuegia, Tristan d'Acunha, and Marion Island.

4. **P. grammitidis**, *R. Br. Prodr.* 147.—Rhizome short, tufted, crowned with subulate-lanceolate scales; roots long, fibrous. Stipes short, wiry, naked, 1–2 in. long. Fronds tufted at the top of the rhizome, very variable in size and shape, 3–9 in. long, 1–3 in. broad, lanceolate to oblong-lanceolate or narrow-ovate, acuminate, sometimes caudate, dark-green, coriaceous, quite glabrous, pinnatifid almost to the rhachis. Pinnæ often unequal, linear, decurrent on the rhachis at the base and confluent; in large states 1–3 in. long, $\frac{1}{6}$ – $\frac{1}{3}$ in. broad, deeply lobed or pinnatifid; in small forms shorter, entire or sinuate or shortly lobed; rarely the pinnæ are reduced to short triangular lobes, so that the frond is narrow-linear in outline. Veins obscure, simple or forked. Sori oblong or rounded, usually one at the base of each segment of the pinnæ, more rarely 2–4 to a segment.—*A. Cunn. Precur.* n. 177; *Raoul, Choix*, 37; *Hook. Sp. Fil.* iv. 230; *Hook. f. Fl. Antarct.* i. 111; *Fl. Nov. Zel.* ii. 41; *Handb. N.Z. Fl.* 380; *Hook. and Bak. Syn. Fil.* 327; *Benth. Fl. Austral.* vii. 764; *Thoms. N.Z. Ferns*, 88; *Field, N.Z. Ferns*, 139, t. 14, f. 3. *Grammitis heterophylla*, *Lab. Pl. Nov. Holl.* ii. 90, t. 239.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS: From the North Cape southwards, abundant in forests on the trunks of trees, more rarely on rocks. Sea-level to 3500 ft.

Also in Tasmania and Victoria.

5. **P. tenellum**, *Forst. Prodr.* n. 440.—Rhizome very long, slender, rigid, wiry, climbing up the trunks of trees or over rocks, clothed with chestnut-brown scales with a dark base. Stipes short, 1–3 in. long, jointed near the rhizome, smooth or more or less scaly. Fronds scattered along the rhizome, erect or pendulous, 1–2 ft. long, 2–5 in. broad, linear-oblong or lanceolate, dark-green, thinly coriaceous, quite glabrous, pinnate; rhachis smooth or slightly scaly. Pinnæ distant, alternate, shortly stipitate, articulate on the rhachis, spreading, $1\frac{1}{2}$ –3 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, lanceolate, attenuate at the tip, obliquely cuneate at the base, entire or obscurely undulate-crenate. Veins all free, once or twice forked. Sori globose, in 2 series in each pinnule, almost close to the margin.—*A. Cunn. Precur.* n. 176; *Raoul, Choix*, 37; *Hook. Sp. Fil.* iv. 217; *Hook. f. Handb. N.Z. Fl.* 380; *Hook. and Bak. Syn. Fil.* 337; *Benth. Fl. Austral.* vii. 764; *Thoms. N.Z. Ferns*, 88; *Field, N.Z. Ferns*, 139, t. 4, f. 4. *Arthropteris tenella*, *J. Sm. ex Hook. f. Fl. Nov. Zel.* ii. 43, t. 82. *A. filipes*, *Moore, Ind. Fil.* 84.

NORTH ISLAND: In woods from the Three Kings Islands and the North Cape to Cook Strait, but often local. SOUTH ISLAND: Vicinity of Nelson, *Kirk. Banks Peninsula*, *Armstrong*.

Also in Norfolk Island, Australia, and New Caledonia.

6. **P. serpens**, *Forst. Prodr.* n. 435.—Rhizome long, creeping, branched, climbing up the trunks of trees or over rocks, clothed with lanceolate long-acuminate ferruginous scales. Stipites remote, $\frac{1}{2}$ –3 in. long, firm, erect, jointed on the top of a scaly prolongation of the rhizome. Fronds dimorphous, simple, entire or obscurely sinuate, very thick and coriaceous, dark-green or yellow-green, glabrous or nearly so above, beneath densely clothed with whitish or buff-coloured stellate scales; sterile fronds variable in size and shape, 1–3 or even 4 in. long, $\frac{1}{2}$ –1 in. broad, obovate-spathulate or elliptical-spathulate to nearly orbicular, obtuse; fertile longer and narrower, 2–6 in. long, $\frac{1}{2}$ – $\frac{3}{4}$ in. broad, linear-oblong or linear-lanceolate, obtuse or subacute, gradually tapering into the stipes. Veins quite hidden in the substance of the frond, copiously anastomosing. Sori very copious, irregularly scattered, large, prominent, often confined to the upper part of the frond, usually confluent in age.—*Hook. and Bak. Syn. Fil.* 349; *Benth. Fl. Austral.* vii. 767; *Thoms. N.Z. Ferns*, 89; *Field, N.Z. Ferns*, 140, t. 6, f. 9. *P. rupestre*, *R. Br. Prodr.* 136; *Hook. f. Handb. N.Z. Fl.* 381; *Hook. Sp. Fil.* v. 46. *P. stellatum*, *A. Rich. Fl. Nouv. Zel.* 64. *Nipholobolus rupestris*, *Spreng. Syst. Veg.* iv. 44; *Hook. and Grev. Ic. Fil.* t. 93; *A. Cunn. Precur.* n. 178; *Raoul, Choix*, 37; *Hook. f. Fl. Nov. Zel.* ii. 44. *N. bicolor*, *Kaulf. Enum. Fil.* 128; *Hook. and Grev. Ic. Fil.* t. 44; *A. Cunn. Precur.* n. 179. *N. serpens*, *Endl. Prodr. Ins. Norfolk*, 8.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 3500 ft.

Plentiful in eastern Australia, also found in Norfolk Island and several of the Pacific islands.

7. **P. Cunninghamii**, *Hook. Sp. Fil.* v. 58.—Rhizome small, short, knot-like, densely clothed with brownish lanceolate scales, emitting woolly rootlets, some of which creep and produce new tufts of fronds. Fronds tufted at the top of the rhizome, 4–12 in. long, $\frac{2}{3}$ – $\frac{3}{4}$ in. broad, lanceolate or linear-lanceolate, acuminate, very gradually narrowed to the base or to a short stipes, quite entire, bright-green, rather fleshy but hardly coriaceous, quite glabrous; midrib stout, evident. Veins hidden in the substance of the frond, anastomosing, forming elongated hexagonal areoles without included free veinlets. Sori large, broadly oblong or rounded, prominent, rather far apart, in a single row on each side of the frond, nearer the midrib than the margin.—*Hook. f. Handb. N.Z. Fl.* 381; *Hook. and Bak. Syn. Fil.* 354; *Thoms. N.Z. Ferns*, 89; *Field, N.Z. Ferns*, 141, t. 15, f. 5. *P. attenuatum*, *A. Rich. Fl. Nouv. Zel.* 62; *A. Cunn. Precur.* n. 173; *Raoul, Choix*, 37; *Hook. Ic. Plant.* t. 409 (not of *R. Br.*). *Dictymia lanceolata*, *J. Sm. in Bot. Mag.* vol. 72, *Suppl.* 16; *Hook. f. Fl. Nov. Zel.* ii. 43. *Dictyopteris lanceolata*, *J. Sm. Gen. Ferns*, 64.

NORTH ISLAND: In forests from the North Cape to Cook Strait, not uncommon, usually on the trunks of trees or on rocks. SOUTH ISLAND: Nelson—Maitai Valley, T. F. C. Marlborough—Buchanan. Canterbury—Akaroa, Raoul. Sea-level to 2500 ft.

Also in the New Hebrides. I have seen no specimens from the south of Nelson.

8. *P. pustulatum*, Forst. Prodr. n. 436.—Rhizome very long, much branched, climbing up the trunks of trees or over rocks, everywhere clothed with squarrose linear-subulate dark-brown scales. Stipites scattered along the rhizome, 2–4 in. long, firm, slender, glabrous. Fronds very variable in size and outline, dark-green, thin and membranous, quite glabrous, sometimes 3–9 in. long, $\frac{1}{3}$ – $\frac{2}{3}$ in. broad, linear-lanceolate, acuminate, gradually narrowed into the stipes, quite entire; at other times 6–18 in. long, 2–6 in. broad, cut down to a broadly winged rhachis into few or many linear-lanceolate acuminate segments; segments rather distant, 1–3 in. long, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad, straight or falcate. Veins not very distinct, anastomosing, forming large irregular areoles with included free veinlets. Sori rather small, distant, broadly oblong or rounded, forming a row parallel with the margin and just within it, sunk in a shallow cavity of the frond and thus forming a pustule on the upper surface.—A. Cunn. Precur. n. 175; Raoul, Choix, 37; Hook. Sp. Fil. v. 80; Hook. f. Handb. N.Z. Fl. 382; Hook. and Bak. Syn. Fil. 363; Thoms. N.Z. Ferns, 89; Field, N.Z. Ferns, 141, t. 17, f. 2. *P. scandens*, Forst. Prodr. n. 437; Benth. Fl. Austral. vii. 770. *Phymatodes pustulata*, Presl, Pterid. 196; Hook. f. Fl. Nov. Zel. ii. 42. *Pleopeltis pustulata*, Moore, Ind. Fil.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in woods from the North Cape to Nelson, Marlborough, and Westland, from thence less common to the south of Otago. Sea-level to 2500 ft.

Found also in eastern Australia, from Queensland to Victoria, and in Norfolk Island. The fronds are fragrant when freshly dried, and were formerly used by the Maoris for scenting oil for applying to the person. Mr. Carruthers (Fl. Vitiensis, 369) considers that this is Forster's *P. scandens*, and that his *P. pustulatum* is the same as *P. Billardieri*.

9. *P. Billardieri*, R. Br. Prodr. 147.—Rhizome long, stout, creeping, often glaucous, clothed with appressed ovate-lanceolate acuminate scales, which are dark-brown or almost black with usually a pale scarious margin. Stipes jointed on to the rhizome, 2–8 in. long, stout, firm, erect, smooth and glossy, quite naked. Fronds numerous, scattered along the rhizome, bright-green, coriaceous, quite glabrous, polymorphous; sometimes 3–9 in. long, $\frac{1}{2}$ –2 in. broad, lanceolate or ovate-lanceolate, entire; at other times 6–18 in. long, 3–9 in. broad, deeply pinnatifid. Segments varying in number from 1 to 12 on a side, 1–5 in. long, $\frac{1}{3}$ – $1\frac{1}{4}$ in. broad, oblong-lanceolate or linear, usually acuminate, confluent at the base with the broadly winged rhachis. Veins conspicuous, the

primary ones irregular, enclosing between them several areoles with free included veinlets. Sori numerous, large, orbicular, forming a single row on each side of the midrib, medial or rather nearer the margin than the midrib.—*A. Cunn. Precur.* n. 174; *Raoul, Choix*, 37; *Hook. Sp. Fil.* v. 82; *Hook. and Bak. Syn. Fil.* 364; *Thoms. N.Z. Ferns*, 90; *Field, N.Z. Ferns*, 141, t. 2, f. 4. *P. Phymatodes*, *A. Rich. Fl. Nouv. Zel.* 66 (not of Linn.). *P. scandens*, *Lab. Pl. Nov. Holl.* ii. 91, t. 240 (not of Forst.). *Phymatodes* *Billardieri*, *Presl, Pterid.* 196; *Hook. f. Fl. Antarct.* i. 111; *Fl. Nov. Zel.* ii. 42.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS: Abundant throughout, usually on trees or rocks, but sometimes on the ground. Sea-level to 3000 ft.

Found also in Norfolk Island, Lord Howe Island, Australia, and Tasmania, and very closely allied to the tropical *P. Phymatodes*, Linn.

10. ***P. novæ-zealandiæ***, *Bak. in Hook. Ic. Plant.* t. 1674.—Rhizome long, stout, woody, as thick as the finger, densely clothed with large tawny ovate-lanceolate scales. Stipes 6–12 in. long, firm, erect, pale-brown, shining, quite naked. Fronds scattered along the rhizome, large, 1–4 ft. long, 6–14 in. broad, oblong-lanceolate, acuminate, thinly coriaceous, dark-green, quite glabrous, deeply pinnatifid or almost pinnate at the base; rhachis narrowly winged. Segments (or pinnæ) 8–20 pairs, opposite or nearly so, ascending, 4–8 in. long, about $\frac{1}{2}$ in. broad, linear-lanceolate, acuminate, quite entire or obscurely sinuate, the lower ones sometimes narrowed towards the base. Veins indistinct, copiously anastomosing; areoles rather large with included free veinlets. Sori large, globose, forming a single row on each side of the midrib, rather nearer the margin than the midrib.—*Ann. Bot.* v. (1891) 479; *Thoms. N.Z. Ferns*, 90; *Field, N.Z. Ferns*, 142, t. 27, f. 3.

NORTH ISLAND: Te Aroha, Pirongia, and Karioi Mountains, *T. F. C.*; Lake Waikaremoana, *A. Hamilton!* Waimarino Forest, *R. Curtis!* forest to the west of Ruapehu, *H. C. Field!* Usually on logs or climbing up trees, rarely on the ground. 1500–3000 ft.

Apparently confined to the forest country in the central portions of the North Island. Closely allied to *P. Billardieri*, but the rhizome is much stouter, and densely clothed with shaggy spreading scales; the fronds are larger, often 4 ft. long, and more deeply pinnatifid; the segments are more numerous, longer and narrower; the venation is not so distinct, and the texture thinner. There is also no tendency to the polymorphism of the fronds so noticeable in both *P. Billardieri* and *P. pustulatum*, and simple fronds are apparently unknown.

23. **NOTHOCHLÆNA**, R. Br.

Rhizome short and tufted or long and creeping. Fronds usually small, erect, pinnate or 2–3-pinnate; under-surface more or less densely scaly or woolly or coated with white powder; texture coriaceous. Veins free, forked, not anastomosing. Sori marginal, oblong or rounded, terminating the veins, at first distinct, but soon

confluent into a continuous or interrupted marginal line, often partly concealed by the slightly inflexed margin of the frond, but with no true indusium. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

A genus of between 30 and 40 species, widely dispersed through the tropical and warm temperate regions of both hemispheres. It hardly differs from *Cheilanthes*, except in the recurved margin of the frond not being distinctly modified into an indusium. The single New Zealand species is also found in Australia, Norfolk Island, and New Caledonia.

1. *N. distans*, *R. Br. Prodr.* 146.—Rhizome short, stout, sub-erect or prostrate, clothed with the bases of the old stipites and with ferruginous linear scales. Stipes 1–4 in. long, stiff, wiry, erect, dark chestnut-brown, more or less clothed with subulate-lanceolate scales. Fronds numerous, tufted at the top of the rhizome, 3–6 in. long without the stipes, $\frac{1}{2}$ –1 in. broad, linear-oblong, erect, rigid, subcoriaceous, sparingly villous or hairy above, beneath densely covered with long linear-subulate ferruginous scales, 2-pinnate. Primary pinnae stipitate, opposite or nearly so, the lower remote, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, ovate-deltoid, pinnate at the base, pinnatifid above. Pinnules few, seldom more than 2–3 pairs, ovate-oblong, obtuse, the lowest pinnatifid at the base; margins recurved. Sori forming a continuous line round the margin.—*Hook. Ic. Plant.* t. 980; *Sp. Fil.* v. 114; *Hook. f. Fl. Nov. Zel.* ii. 46; *Handb. N.Z. Fl.* 383; *Hook. and Bak. Syn. Fil.* 372; *Benth. Fl. Austral.* vii. 774; *Thoms. N.Z. Ferns*, 91; *Field, N.Z. Ferns*, 143, t. 16, f. 3.

NORTH ISLAND: Rocky places from the Bay of Islands to Cook Strait, local. SOUTH ISLAND: Near Nelson, *T. F. C.* Banks Peninsula and other localities in Canterbury, *Armstrong, T. H. Potts.* Sea-level to 2500 ft.

Often confused with *Cheilanthes Sieberi*, of which it has the habit and general appearance; but a smaller plant, with the frond conspicuously shaggy and scaly beneath.

24. GYMNOGRAMME, Desv.

Rhizome short and tufted or long and creeping. Fronds very various, small or large, pinnate or 2–3-pinnate, rarely simple. Veins simple or forked, or more or less copiously anastomosing. Sori placed on the veins on the under-surface of the fronds, oblong or linear, often elongated, simple or forked. Indusium not developed. Sporangia stalked, bursting transversely, surrounded by an incomplete vertical ring.

As defined above, this is a heterogeneous assemblage of over 100 species, differing greatly from one another in habit, venation, and the arrangement of the sori, and often split up by authors into several small genera. It is widely spread in most tropical countries, but comparatively few species reach the temperate zones.

Perennial. Fronds pinnate or 2-pinnatifid, subcoriaceous, densely clothed with ferruginous woolly hairs	..	1. <i>G. rutæfolia</i> .
Annual. Fronds 2–3-pinnate, thin and membranous, quite glabrous	.. .. .	2. <i>G. leptophylla</i> .

1. *G. rutæfolia*, *Hook. and Grev. Ic. Fil.* t. 90.—Rhizome short, thick, erect or ascending, clothed with blackish-brown lanceolate scales. Stipes $\frac{1}{4}$ –1 in. long, stout or slender, everywhere densely villous with soft ferruginous woolly often glandular hairs. Fronds 1–3 in. long by about $\frac{1}{2}$ in. broad, linear-oblong, obtuse, subcoriaceous, pinnate; both surfaces densely clothed with soft ferruginous or silvery-brown woolly hairs, many of which are glandular-tipped. Pinnæ alternate, rather distant, $\frac{1}{8}$ – $\frac{1}{2}$ in. long, obovate or rhomboid or flabellate, shortly stipitate and obliquely cuneate at the base, the lowermost with 2–3 shallow lobes or rarely pinnatifid. Veins flabellate. Sori linear-oblong, occupying most of the veins of the under-surface, distinct at first, but often confluent in age.—*Hook. Fil. Exot.* t. 5; *Sp. Fil.* v. 137; *Hook. f. Fl. Nov. Zel.* ii. 45; *Handb. N.Z. Fl.* 383; *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 359. *G. Pozoi* var. *rutæfolia*, *Hook. and Bak. Syn. Fil.* 379; *Thoms. N.Z. Ferns*, 91; *Field, N.Z. Ferns*, 144, t. 10, f. 1. *G. alpina*, *Potts in Trans. N.Z. Inst.* x. (1878) 361. *Grammitis rutæfolia*, *R. Br. Prodr.* 146; *Benth. Fl. Austral.* vii. 775. *Ceterach rutæfolius*, *Mett. Fil. Hort. Lips.* 80. *Pleurosorus rutæfolius*, *Fée. Gen. Fil.* 180.

NORTH ISLAND: Hawke's Bay—Petane, *A. Hamilton!* Kuripapanga, *H. Hill!* Wellington—Cliffs in Cook Strait, *Colenso!* Cape Terawiti, *Field.* SOUTH ISLAND: Marlborough—D'Urville Island, *E. Craig!* Brothers Islands, *Field.* Canterbury—Banks Peninsula, Upper Ashburton, Upper Rangitata, *T. H. Potts!* Southern Alps, *J. D. Enys!* Otago—Black's, *Petrie.* Sea-level to 3500 ft.

Also widely distributed in Australia and Tasmania. It is united by most authors to the European *G. Pozoi*, which, however, seems to me to differ in the more slender habit, in being much less densely villous, the hairs seldom glandular, and in the narrower oblong (not obovate or flabellate) pinnæ.

2. *G. leptophylla*, *Desv. Journ. Bot.* i. 26.—Slender, delicate, annual, 1–6 in. high. Roots fibrous. Stipes $\frac{1}{2}$ –3 in. long, slender, brittle, smooth, glossy, bright chestnut-brown. Fronds 1–3 in. long, $\frac{1}{2}$ –1 in. broad, ovate or ovate-oblong to oblong-lanceolate; the outer spreading, much shorter and broader, usually sterile; the inner longer and narrower, fertile, erect; pale-green, shining, thin and membranous, quite glabrous, 2–3-pinnate. Pinnæ alternate, stipitate, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, again pinnate; secondary rhachises margined throughout. Pinnules few, obovate-cuneate, 2–3-lobed or -partite; lobes linear or linear-oblong, obtuse. Veins forked, a single veinlet only to each lobe. Sori oblong or linear-oblong, usually a single one to each lobe, often becoming confluent and covering the whole pinnule.—*Hook. and Grev. Ic. Fil.* t. 25; *Sp. Fil.* v. 136; *Hook. f. Fl. Nov. Zel.* ii. 45; *Handb. N.Z. Fl.* 383; *Hook. and Bak. Syn. Fil.* 383; *Thoms. N.Z. Ferns*, 92; *Field, N.Z. Ferns*, 144, t. 16, f. 6. *G. novæ-zealandiæ*, *Col. in Tasm. Journ. Nat. Sci.* (1845) 5. *Grammitis leptophylla*, *Swartz, Syn. Fil.* 218; *Benth. Fl. Austral.* vii. 776. *Anogramme leptophylla*, *Link.*

NORTH ISLAND: Auckland—Volcanic hills on the Auckland Isthmus, once common, now rare and apparently restricted to Mount Wellington and Mount Smart, *Colenso*, &c.; Mount Maunganui (near Tauranga), *Mrs. Hetley*! East Cape district, *Bishop Williams*. Hawke's Bay—Scinde Island, *Colenso*! Ruahine Mountains, *H. Tryon*! Wellington—Miramar, *Buchanan*! **SOUTH ISLAND:** Canterbury—Lyttelton Harbour, abundant, *T. H. Potts*! Otago—Near Dunedin, *Purdie*; Upper Clutha, *Petrie*. Sea-level to 1500 ft.

Also in south Europe, North and South Africa, Persia, India, Australia and Tasmania, and South America.

25. GLEICHENIA, Smith.

Rhizome long, creeping, rigid and wiry, often clothed with chaffy scales. Stipes tall, erect or scrambling, usually rather slender. Fronds once or several times dichotomously forked, usually with a terminal bud in the fork, the divisions often spreading in a horizontal plane, ultimate branches pinnately divided. Segments of the pinnæ rather small and broadly ovate or suborbicular, or larger and oblong to linear-lanceolate. Veins free. Sori dorsal, placed on the fork or at the tip of an exterior veinlet, of 2–12 sporangia. Indusium wanting. Sporangia sessile, splitting vertically, completely surrounded by a broad transverse ring.

Species about 26, chiefly tropical, but one species extends as far north as Japan, and 5 are found in New Zealand. Of these, 1 is widely spread in hot countries, 3 extend to Australia and New Caledonia, the remaining 1 is endemic.

* **EUGLEICHENIA.** *Segments of the pinnæ small, suborbicular. Sori solitary at the apex of a veinlet.*

Segments of the pinnæ flat or slightly recurved. Sporangia
2–4, near the upper inner angle 1. *G. circinata*.
Segments of the pinnæ with their margins incurved almost
to the rhachis, hence pouch-shaped. Sporangia usually 2 2. *G. dicarpa*.

** **MERTENSIA.** *Segments of the pinnæ linear or linear-oblong, much larger than in the previous section. Sori near the middle or at the fork of a veinlet.*

† No accessory pinnæ at the base of the lower forks of the frond.

Fronds umbrella-shaped, rigid and coriaceous. Segments
of the pinnæ entire, glaucous beneath. Sporangia 2–5 3. *G. Cunninghamii*.
Fronds fan-shaped, submembranous. Segments of the
pinnæ serrulate, green on both surfaces. Sporangia 3–5 4. *G. flabellata*.

†† A pair of spreading or deflexed accessory pinnæ at the base of the lower forks of the frond.

Fronds repeatedly dichotomous, the ultimate branches
ending in a pair of pinnæ 3–12 in. long. Pinnules
lanceolate, obtuse, glaucous beneath. Sporangia 6–12 5. *G. dichotoma*.

1. *G. circinata*, Swartz, *Syn. Fil.* 165, 394.—Very variable in size and mode of growth, sometimes stiff, erect, 1–3 ft. high; sometimes weak and scrambling among other vegetation and attaining a length of 3–5 ft. or more. Rhizome long, slender, wiry, often much

branched, more or less clothed with reddish-brown fimbriate scales. Stipes smooth, slender, cylindrical, glabrous or more or less densely scaly and woolly. Fronds usually repeatedly dichotomous and proliferous from the lower axils; branches zigzag, spreading, often interlaced; rhachides generally clothed with rusty-red stellate hairs often mixed with fimbriate scales, rarely glabrous. Pinnæ numerous along the branches, spreading, $\frac{1}{2}$ –2 in. long, $\frac{1}{12}$ – $\frac{1}{8}$ in. broad, narrow-linear, uniformly pinnatifid to the base. Segments numerous, closely placed, broadly ovate or orbicular, obtuse, adnate by a broad base, flat or concave beneath, not cucullate nor pouch-shaped, coriaceous or almost membranous, green or glaucous beneath, glabrous or the costa more or less woolly and chaffy. Veins pinnately branched. Sori solitary in the segments, placed at the tip of the exterior veinlet near the upper angle of the segment, of 2–4 sporangia.—*Hook. and Bak. Syn. Fil.* 11; *Hook. f. Handb. N.Z. Fl.* 347 (excl. var. *hecistophylla*); *Benth. Fl. Austral.* vii. 697; *Thoms. N.Z. Ferns*, 25; *Field, N.Z. Ferns*, 36, t. 2, f. 2. *G. semi-vestita*, *Lab. Sert. Nov. Cal.* 8, t. 11; *Hook. Sp. Fil.* i. 3, t. 2A; *Hook. f. Fl. Nov. Zel.* ii. 5 (excl. var. *hecistophylla*). *G. microphylla*, *R. Br. Prodr.* 161. *G. speluncæ*, *R. Br. Prodr.* 160. *G. punctulata*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 344. *G. patens*, *Col. in Trans. N.Z. Inst.* xx. (1888) 212.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards, plentiful in the North Island, but rare and local to the south of Cook Strait. Sea-level to 2000 ft. *Waewaekaka*; *Waewaematuku*.

Common in Australia, also extending to New Caledonia and Malaya. Mr. Colenso's *G. patens* is an excessively proliferous state with slender almost subscandent stems, forming large masses in heated soil near hot springs at Taupo. The fronds are more membranous than usual, but that and its other peculiarities are easily accounted for by the exceptional nature of its habitat.

2. *G. dicarpa*, *R. Br. Prodr.* 161.—Very similar to *G. circinata* in habit and mode of growth, but smaller, 1–2½ ft. high. Rhizome slender, wiry, usually clothed with chaffy scales. Stipes smooth, slender, glabrous or scaly-hispid. Fronds several times dichotomous, usually proliferous; branches spreading in a horizontal plane, often interlaced; rhachides scaly and hairy or sometimes almost glabrous. Pinnæ numerous along the branches, spreading, $\frac{1}{2}$ –1¼ in. long, $\frac{1}{25}$ – $\frac{1}{10}$ in. broad, very narrow-linear, deeply and uniformly pinnatifid. Segments numerous, closely placed, small, suborbicular, coriaceous, convex above, the margins so much recurved beneath that the segment is cucullate or pouch-shaped, usually clothed with woolly hairs beneath. Sori one to each segment, just visible in the pocket-like cavity of the segment, or concealed by woolly hairs; sporangia 1–2, rarely more.—*Hook. Sp. Fil.* i. 3, t. 1c; *Hook. f. Fl. Nov. Zel.* ii. 5; *Handb. N.Z. Fl.* 348; *Benth. Fl. Austral.* vii. 698; *Hook. and Bak. Syn. Fil.* 12; *Thoms. N.Z. Ferns*, 25; *Field, N.Z. Ferns*, 37.

Var. **hecistophylla**.—Usually 1–3 ft. high. Frond much and closely dichotomously branched, usually spreading in a horizontal plane; stipes and rhachis densely woolly and scaly. Segments strongly incurved beneath, sometimes as much as in the typical form, but variable in this respect.—*G. hecistophylla*, *A. Cunn. Precur.* n. 163; *Hook. Sp. Fil.* i. 4, t. 2B. *G. semi-vestita* var. *hecistophylla*, *Hook. f. Fl. Nov. Zel.* ii. 5. *G. circinata* var. *hecistophylla*, *Hook. f. Handb. N.Z. Fl.* 348.

Var. **alpina**, *Hook. f. Fl. Tasm.* ii. 131.—Smaller and more compactly tufted, 2–12 in. high; rhachis, young shoots, and under-surface of segments densely clothed with ferruginous wool mixed with scales. Fronds much smaller and more sparingly divided.—*Handb. N.Z. Fl.* 348; *Benth. Fl. Austral.* vii. 698. *G. alpina*, *R. Br. Prodr.* 161; *Hook. and Grev. Ic. Fil.* t. 58; *Hook. Sp. Fil.* i. 2.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Var. *hecistophylla* abundant in swampy places on poor soils in the North Island, local elsewhere. Sea-level to 2000 ft. Var. *alpina*: Mountainous localities from Moehau (Cape Colville) and Rotorua southwards, ascending to 4500 ft.

As a species, *G. dicarpa* stands very near to *G. circinata*, principally differing in the smaller segments of the pinnæ, which have their margins incurved almost to the costa, leaving only a narrow slit open, through which the sori are visible unless masked by the ferruginous tomentum. I have followed the "Synopsis Filicum" in placing Cunningham's *G. hecistophylla* under *G. dicarpa*, but it has equal claims to be included with *G. circinata*, which was the position given to it by Sir J. D. Hooker, both in the Flora and the Handbook. The late Baron Mueller justly observed (*Veg. Chath. Isl.* 63) that it obliterates the limits of the two species. The typical form of *G. dicarpa* occurs in eastern Australia, New Caledonia, and Malaya, and var. *alpina* in Tasmania.

3. ***G. Cunninghamii***, *Heward ex Hook. Sp. Fil.* i. 6, t. 6B.—Usually from 1–3 ft. high, but taller plants are sometimes seen. Rhizome long, branched, creeping, stout and woody, clothed with red-brown lanceolate scales. Stipes stout, erect, grooved down one side, in the young state densely clothed with large deciduous scales, becoming almost glabrous when old. Fronds several times dichotomously branched, the branches usually spreading all round in a horizontal plane and forming an umbrella-like top to the stipes, in large specimens proliferous from the centre, so that frequently there are 2–4 superposed tiers of branches. Ultimate branches or pinnæ 3–12 in. long, $\frac{1}{2}$ – $1\frac{1}{4}$ in. broad, linear-lanceolate, acuminate, deeply pectinate-pinnatifid above, pinnate below; rhachis usually clothed with deciduous scales and pilose. Segments $\frac{1}{3}$ – $\frac{2}{3}$ in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad, linear, straight or often falcate, acute, quite entire, coriaceous, dark-green and glabrous above, glaucous and usually pilose beneath; margins flat or recurved. Transverse veins numerous, forked near the base. Sori copious, solitary on one of the veinlets, of 2–5 sporangia.—*Hook. f. Fl. Nov. Zel.* ii. 6, t. 71; *Handb. N.Z. Fl.* 348; *Hook. and Bak. Syn. Fil.* 13; *Thoms. N.Z. Ferns*, 26; *Field, N.Z. Ferns*, 39, t. 7, f. 3. *G. ciliata*, *Col. in Trans. N.Z. Inst.* xxix. (1897) 414.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In forests from the North Cape southwards, abundant in the North Island, local to the south of Cook Strait. Sea-level to 4000 ft. *Umbrella Fern*; *Tapuwaekotuku*.

Allied to *G. flabellata*, but the fronds spread in a horizontal plane, and are much more rigid and coriaceous, and the segments are shorter and narrower, quite entire, and glaucous beneath. It appears to be confined to New Zealand.

4. *G. flabellata*, *R. Br. Prodr.* 161.—From 1 to 4 ft. high. Rhizome long, stout, branched, more or less clothed with reddish-brown lacinate scales. Stipes erect, cylindrical below, subcompressed above, slightly scaly or almost glabrous. Fronds several times dichotomously branched, ascending and fan-shaped, not spreading in a horizontal plane, often proliferous from the lower forks, so that there are sometimes 2–3 tiers of superposed branches. Ultimate branches or pinnæ 4–12 in. long, 1–2 in. broad, lanceolate, acuminate or caudate, deeply pectinate-pinnatifid or pinnate towards the base. Segments close-set, ascending, $\frac{1}{2}$ –1 in. long, narrow-linear, subacute, serrulate towards the tip, dilated at the base, green on both surfaces, glabrous above, often more or less scaly-pubescent beneath. Transverse veins numerous, forked near the base. Sori copious, solitary on one of the veinlets, of 3–5 sporangia.—*A. Cunn. Precur.* n. 164; *Raoul, Choix*, 37; *Hook. Sp. Fil.* i. 6; *Fil. Exot.* t. 71; *Hook. f. Fl. Nov. Zel.* ii. 6; *Handb. N.Z. Fl.* 348; *Hook. and Bak. Syn. Fil.* 12; *Benth. Fl. Austral.* vii. 698; *Thoms. N.Z. Ferns*, 26; *Field, N.Z. Ferns*, 41, t. 8, f. 1. *G. littoralis*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 344.

NORTH ISLAND: Auckland.—Not uncommon by the side of streams, &c., from the North Cape to the Bay of Islands, rare and local southwards to the Kauaeranga River (Thames) and the Manukau Harbour.

Also in Australia, ranging from Queensland to Tasmania, and in New Caledonia. Mr. Colenso's *G. littoralis* is certainly nothing more than a dwarf state, usually occurring near the sea.

5. *G. dichotoma*, *Hook. f. Sp. Fil.* i. 12.—Usually from 2 to 4 ft. high, but sometimes dwarfed to a few inches, and occasionally reaching 6 ft. Rhizome long, slender, clothed with narrow reddish-brown bristly scales. Stipes slender, smooth and polished. Fronds repeatedly dichotomous or trichotomous, the ultimate branches ending in a pair of pinnæ 3–12 in. long; a pair of smaller spreading or deflexed pinnæ is also placed at the base of the lower forks. Pinnæ lanceolate, acuminate, pinnatifid almost to the base. Segments close, spreading, $\frac{1}{2}$ –1 in. long, linear, entire, obtuse or emarginate, glaucous beneath and sometimes pubescent on the costa, firm or more or less membranous, pale-green. Veins transversely spreading from the costa, each one pinnately divided from near the base into 3–6 veinlets. Sori solitary on an exterior veinlet, of 6–12 sporangia.—*Hook. and Bak. Syn. Fil.* 15; *Hook. f. Handb. N.Z. Fl.* 747; *Benth. Fl. Austral.* vii. 698; *Thoms. N.Z. Ferns*, 27; *Field, N.Z. Ferns*, 39, t. 4, f. 1. *G. Hermannii*, *R. Br. Prodr.* 161. *Mertensia dichotoma*, *Willd.* *Polypodium dichotomum*, *Thunb. Fl. Jap.* 338, t. 37.

NORTH ISLAND: Auckland—In heated soil near hot springs; Rotomahana, *Captain G. Mair! Kirk!* (in this locality destroyed by the eruption of Tarawera in 1886); Otumakokori and Orakeikorako, *Kirk! T. F. C.*; Karapiti, *Hochstetter*; Wairakei, *Norton! Field, T. F. C.*; hot springs near Matata, *Captain G. Mair.* Sea-level to 1600 ft.

Almost universal in tropical and subtropical countries. Forster, in his "Esculent Plants" (p. 75), recorded it as a native of New Zealand, and stated that the roots were eaten by the Natives; but as he only collected in the South Island it is extremely improbable that he ever saw it in New Zealand, and there is no other record of the roots being eaten.

26. SCHIZÆA, Smith.

Rhizome short, thick, creeping. Stipes rigid, wiry, erect. Fronds simple or forked or dichotomously branched, flat or terete, very narrow, without expanded laminæ. Sori on the under-surface of fertile segments terminating the frond or its branches, each segment consisting of a number of crowded linear pinnæ, those of the opposite sides being usually applied to one another so as to conceal the under-surface. Sporangia ovoid, sessile, splitting vertically, crowned by a complete transverse ring, arranged in 2 or rarely 4 rows on the under-surface of the pinnæ of the fertile segments.

A small genus of about 18 species, dispersed through the tropical or warm temperate regions of both hemispheres. Two of the New Zealand species are widely distributed; the third extends to Australia alone.

Fronds smooth, terete or nearly so, undivided	1. <i>S. fistulosa</i> .
Fronds scabrous, terete or obscurely compressed, forked or rarely twice-forked	2. <i>S. bifida</i> .
Fronds smooth, compressed, repeatedly dichotomously forked, flabellate	3. <i>S. dichotoma</i> .

1. *S. fistulosa*, *Labill. Pl. Nov. Holl.* ii. 103, t. 250.—Rhizome short, thick, creeping, clothed with dark chestnut-brown linear scales. Fronds numerous towards the end of the rhizome, not distinct from the stipes, dark-brown below, greenish-brown above, 4–12 in. long, $\frac{1}{40}$ in. broad, filiform, erect or flexuous, rigid, wiry, terete, grooved down the face, unbranched. Fertile segment terminating the frond, $\frac{1}{2}$ –1 in. long, erect or suberect, consisting of 10–20 closely placed pinnæ on each side; pinnæ all pointing in one direction, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear, incurved at the tip; margins denticulate or fringed. Sporangia in 2 closely placed rows, covering the whole of the under-surface.—*Hook. f. Handb. N.Z. Fl.* 749; *Hook. and Bak. Syn. Fil.* 429; *Benth. Fl. Austral.* vii. 693; *Thoms. N.Z. Ferns*, 95; *Field, N.Z. Ferns*, 150, t. 14, f. 5. *S. propinqua*, *A. Cunn. Precur.* n. 168.

Var. *australis*, *Hook. f. Handb. N.Z. Fl.* 749.—Smaller, 1–3 in. high; rhizome stouter in proportion. Fertile segment $\frac{1}{4}$ – $\frac{1}{2}$ in. long, of 6–8 pairs of pinnæ.—*S. australis*, *Gaud. Fl. Ins. Mal.* 98; *Hook. f. Fl. Antarct.* i. 111; *Hook. and Bak. Syn. Fil.* 428; *Thoms. N.Z. Ferns*, 95. *S. palmata*, *Homb. and Jacq. Voy. au Pôle Sud, Crypt.* t. 4, f. 2.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, AUCKLAND ISLANDS: The typical form not uncommon in barren clay soils throughout the North Island, apparently rare and local to the south of Cook Strait. Var. *australis*: Cold peaty localities in mountain districts from Moehau (Cape Colville) southwards, descending to sea-level in Stewart Island and the Auckland Islands. Sea-level to 4000 ft.

Also in Australia and Tasmania, New Caledonia, Madagascar, Chili, and the Falkland Islands. *S. australis* is clearly only a depauperated form, connected with the type by transitional stages.

2. *S. bifida*, Swartz, *Syn. Fil.* 151.—Rhizome very short, stout, creeping. Fronds close together along the rhizome, not distinct from the stipes, 6–12 in. high or more, about $\frac{1}{3}$ in. diam., rigid, erect, wiry, more or less scabrous, somewhat flattened, with a prominent midrib and narrow thick wing on each side, usually forked at or below the middle, rarely undivided, the branches sometimes forked a second time. Fertile segments terminating the branches, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, erect or slightly recurved, rather broader than in *S. fistulosa*, of 10–20 closely placed pinnæ on each side. Pinnæ all turned to the one side, $\frac{1}{6}$ – $\frac{1}{3}$ in. long, linear, fringed with long cilia. Sporangia in 2 closely placed rows, rather smaller than in *S. fistulosa*.—*A. Rich. Fl. Nouv. Zel.* 95; *A. Cunn. Precur.* n. 169; *Raoul, Choix*, 37; *Hook. f. Fl. Nov. Zel.* ii. 47, and *Handb. N.Z. Fl.* 385 (in part); *Hook. and Bak. Syn. Fil.* 429; *Benth. Fl. Austral.* vii. 693; *Thoms. N.Z. Ferns*, 96; *Field, N.Z. Ferns*, 151, t. 12, f. 3.

NORTH ISLAND: On sterile clay or pumiceous soils from the North Cape to Cook Strait, but often local. SOUTH ISLAND: Nelson—Takaka and Paramahoi, *Kingsley*. Sea-level to 2000 ft.

Also in Australia and Tasmania. Unbranched specimens are best distinguished from *S. fistulosa* by the scabrous frond and broader fertile segment.

3. *S. dichotoma*, Swartz, *Syn. Fil.* 151.—Rhizome short, stout, creeping. Fronds few or many, close together, 6–14 in. long, erect, rigid, wiry; lower portion or stipes angular, channelled in front; upper portion repeatedly dichotomous, forming a flabellate or deltoid frond 2–4 in. across or more; branches flattened, $\frac{1}{20}$ – $\frac{1}{12}$ in. broad; midrib stout, evident; margins sometimes minutely toothed towards the tip. Fertile segments terminating the branches, distinctly stalked, erect or inclined, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, consisting of 4–10 spreading pinnæ on each side; pinnæ $\frac{1}{8}$ – $\frac{1}{4}$ in. long, linear, fringed with long hairs. Sporangia in two closely placed rows.—*Hook. and Grev. Ic. Fil.* t. 17; *A. Cunn. Precur.* n. 170; *Raoul, Choix*, 37; *Hook. f. Fl. Nov. Zel.* ii. 47; *Handb. N.Z. Fl.* 385; *Hook. and Bak. Syn. Fil.* 430; *Benth. Fl. Austral.* vii. 694; *Thoms. N.Z. Ferns*, 96; *Field, N.Z. Ferns*, 151, t. 24, f. 2.

NORTH ISLAND: Auckland—In kauri forests from Kaitaia and Mongonui southwards to Tairua and the Lower Waikato, not common; in heated soil near hot springs at Orakeikorako, Upper Waikato, Kirk, C. J. Norton! Sea-level to 1500 ft.

A widely spread species, found in the tropical and warm temperate regions of both hemispheres, with the exception of Africa.

27. **LYGODIUM**, Swartz.

Climbing ferns, with long twining stems, often ascending trees to a considerable height. Primary pinnæ distant on the common rhachis or stem, and inserted on it by a short and often almost obsolete petiole, dichotomously divided; the secondary divisions divaricate, stalked, usually again dichotomous, or in species not found in New Zealand pinnately divided. Sterile pinnules ovate to oblong-lanceolate, ligulate; fertile usually much contracted and frequently copiously divided. Sporangia ovoid, obliquely sessile, splitting vertically, crowned by a complete transverse ring, arranged in two rows on the under-surface of the contracted fertile pinnules, or forming short spikes projecting from the margins of the leafy pinnules, each sporangium in the axil of a large scale-like indusium.

A very distinct genus of about 20 species, widely distributed in the tropics of both hemispheres. The single New Zealand species is endemic.

1. **L. articulatum**, A. Rich. *Fl. Nouv. Zel.* 96, t. 15.—Rhizome slender, creeping, clothed with glossy chestnut-brown linear scales. Stipites very numerous, long, slender, climbing, reaching the tops of tall forest-trees, branched, wiry, often intertwined and forming almost impenetrable screens, quite smooth and glabrous. Primary pinnæ dichotomously palmate-partite; primary petiole short, $\frac{1}{8}$ – $\frac{1}{2}$ in. long; two secondary petioles widely diverging, 1 in. or more long, again twice forked; pinnules 2–4 in. long, $\frac{1}{3}$ – $\frac{1}{2}$ in. broad, jointed at the base, ligulate-oblong or oblong-lanceolate, obtuse or subacute, thinly coriaceous, often glaucous beneath. Veins free. Fertile pinnæ many times dichotomous, the ultimate pinnules small, much contracted, cuneate or flabellate, deeply lobed; the lobes ending in closely placed short spikelets, each with 8–12 sporangia on the under-surface.—A. Cunn. *Precur.* n. 167; Raoul, *Choix*, 37; Hook. f. *Fl. Nov. Zel.* ii. 47; *Handb. N.Z. Fl.* 385; Hook. and Bak. *Syn. Fil.* 437; Thoms. *N.Z. Ferns*, 96; Field, *N.Z. Ferns*, 152, t. 22, f. 4. *L. gracilescens*, Col. in *Trans. N.Z. Inst.* xxviii. (1896) 620.

NORTH ISLAND: Auckland—In woods from the North Cape to the Bay of Plenty and Kawhia, abundant. *Mange-mange*. Sea-level to 2500 ft.

The tough and wiry twining stems were formerly twisted into ropes by the Maoris and used for securing the thatch on the roofs of their houses; and they were also employed for making eel-traps.

28. **TODEA**, Willd.

Rhizome stout, erect, sometimes forming a short thick trunk. Fronds tufted at the top of the rhizome, large, coriaceous and opaque, or membranous or pellucid, 2-3-pinnate. Veins simple or forked, not anastomosing. Sori on the under-surface of the frond, of few or many sporangia, placed upon the lateral veinlets proceeding from the costa, either large and covering the greater part of the veinlet, or small and placed at its base. Indusium wanting. Sporangia short-stalked or nearly sessile, splitting vertically, ring rudimentary, transverse.

A small genus of 5 or 6 species, found in Australia, New Zealand, Melanesia, and South Africa. One of the New Zealand species extends both to Australia and South Africa, the remaining two are endemic. Although I have followed Mr. Baker in reducing *Leptopteris* to a section of *Todea*, I am inclined to think that it would be better treated as a distinct genus.

A. *Todea*. Fronds coriaceous, opaque. Sori large, of numerous sporangia.

Fronds 2-6 ft. long, 2-pinnate 1. *T. barbara*.

B. *Leptopteris*. Fronds membranous, pellucid. Sori small, of few sporangia.

Fronds 1-2 ft. long, truncate at the base, the lower pinnæ

not reduced in size 2. *T. hymenophylloides*.

Fronds 1½-4 ft. long, narrowed at the base, the lower

pinnæ gradually reduced in size 3. *T. superba*.

1. **T. barbara**, Moore, *Ind. Fil.* 95.—Rhizome stout, erect, sometimes forming a trunk as much as 4 ft. high and 2 ft. diam. Stipes 1-2 ft. long or more, stout, erect, quite smooth. Fronds 2-4 ft. long, 9-12 in. broad, oblong-lanceolate, acute, dark-green, coriaceous, opaque, quite glabrous, 2-pinnate. Primary pinnæ numerous, close, erecto-patent, 4-10 in. long or more, ½-2 in. broad, lanceolate. Pinnules 1-1½ in. long, ¼-½ in. broad, linear or linear-lanceolate, acute, serrate, the uppermost confluent. Sori towards the base of the frond, usually occupying nearly the whole of the under-surface of the lower pinnules of the lower pinnæ, the remainder of the frond sterile.—Hook. and Bak. *Syn. Fil.* 427; *Bot. Mag.* t. 5954; Benth. *Fl. Austral.* vii. 699; Thoms. *N.Z. Ferns*, 93; Field, *N.Z. Ferns*, 148, t. 26, f. 1. *T. africana*, Willd. in *Schrift. Acad. zu Erfurt* (1802) 14, t. 3, f. 1; Hook. f. *Fl. Nov. Zel.* ii. 48 and 338; *Fl. Tasm.* ii. 153, t. 178; *Handb. N.Z. Fl.* 384. *Osmunda barbara*, Thunb. *Fl. Cap.* 171. *Acrostichum barbarum*, Linn. *Sp. Plant.* 1529.

NORTH ISLAND: Auckland—Abundant in open gullies from the North Cape to Mongonui, and from thence more sparingly southwards to Whangaroa.

Also in Australia, from Queensland to Tasmania, and in South Africa. In Australia the rhizome is often enlarged into a short and massive trunk sometimes weighing as much as a ton and a half, but I have seen no New Zealand specimens as large.

2. **T. hymenophylloides**, *A. Rich. Fl. Nouv. Zel.* 97, t. 16.—Rhizome stout, erect, often produced into a short thick caudex. Stipes 6–12 in. long, slender, wiry, erect, brownish-green, smooth and glabrous or more or less clothed with floccose tomentum. Fronds forming a crown at the top of the rhizome, 1–2½ ft. long, 6–12 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, truncate at the base, very thin and membranous, pellucid, dark-green, 3-pinnatifid; rhachis and costæ more or less clothed with reddish-brown floccose hairs or nearly glabrous. Primary pinnae rather close, 3–6 in. long, $\frac{3}{4}$ –1½ in. broad, lanceolate or oblong-lanceolate, acuminate, the lower ones not gradually reduced in size and becoming very small. Pinnules close-set, $\frac{1}{2}$ –¾ in. long, about ¼ in. broad, linear-oblong, deeply pinnatifid. Segments linear, erecto-patent, acute, entire or forked or sometimes trifid. Sporangia on the midrib of the segments, usually confined to the lower half.—*Hook. Gen. Ferns.* t. 46B; *Garden Ferns*, t. 54; *Hook. and Bak. Syn. Fil.* 427; *Thoms. N.Z. Ferns*, 93; *Field, N.Z. Ferns*, 148, t. 4, f. 3. *T. pellucida*, *Hook. and Grev. in Bot. Misc.* iii. 232; *Hook. Ic. Plant.* t. 8. *T. marginata*, *Col. in Trans. N.Z. Inst.* xxix. (1897) 419. *Leptopteris hymenophylloides*, *Presl*; *Hook. f. Fl. Nov. Zel.* ii. 48; *Handb. N.Z. Fl.* 384.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards, not uncommon in forest districts. Sea-level to 3000 ft.

Confined to New Zealand. A state with the pinnae rather more closely placed, and with the lower ones more or less reduced in size, approaches *T. superba*, and is often distinguished as var. *intermedia* by fern-collectors.

3. **T. superba**, *Col. in Tasmanian Journ. Nat. Sci.* (1845) 28.—Rhizome stout, forming a thick erect caudex 1–3 ft. high, coated with densely matted fibrous rootlets. Stipes 1–4 in. long, stout, erect, more or less densely tomentose. Fronds forming a handsome spreading crown at the top of the rhizome, 1½–4 ft. long, 6–10 in. broad, lanceolate, acuminate, very gradually narrowed to the base, dark-green, thin and membranous, pellucid, 3-pinnatifid; rhachis stout, densely woolly-tomentose, as are the secondary rhachises. Primary pinnae very numerous, close-set, the longest ones about the middle of the frond, 3–6 in. long, $\frac{1}{2}$ –¾ in. broad, linear or linear-lanceolate, acuminate; the lower ones gradually diminishing in size, the lowermost minute. Pinnules very close, much overlapping, ¼–½ in. long, linear-oblong, pinnatifid almost to the base. Segments narrow-linear, simple or forked. Sporangia much as in *T. hymenophylloides*.—*Hook. and Bak. Syn. Fil.* 428; *Thoms. N.Z. Ferns*, 94; *Field, N.Z. Ferns*, 149, t. 21, f. 4. *Leptopteris superba*, *Hook. Ic. Plant.* t. 910; *Hook. f. Fl. Nov. Zel.* ii. 48; *Handb. N.Z. Fl.* 384.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In dense moist forests from Te Aroha and Pioronga southwards, not uncommon, except in Marlborough, Canterbury, and the north of Otago, where it is rare and local. *Crape-fern*; *Prince of Wales's Feather*. Sea-level to 3500 ft.

Probably the most beautiful fern in New Zealand. It is closely allied to the preceding, and is connected with it by intermediate forms. Usually, however, it is readily distinguished by the larger and narrower frond, which tapers very gradually to the base, and by the closer and denser pinnules, which overlap considerably, the segments often turning up towards the upper side of the frond.

29. *MARATTIA*, Smith.

Rhizome large, thick and swollen. Fronds numerous, large, 2-3-pinnate; stipes stout, articulated at the base, and furnished with two adnate auricles. Veins all free. Sori oblong, placed at or near the tip of the veins, close to the margin of the pinnules, each sorus consisting of two parallel rows containing 4-12 sporangia, the sporangia of each row completely united into a boat-shaped mass called a synangium. Synangia coriaceous, the outer face smooth and convex, the inner flat and pierced by the narrow transverse slits of the dehiscent sporangia. Spores globose-tetrahedral.

A small genus of 8-10 species, widely scattered through the tropical regions of both hemispheres and the warmer part of the south temperate zone. The single New Zealand species is found in Australia and Polynesia, South Africa, Malaya, Philippines, and India.

1. *M. fraxinea*, Smith, *l.c. Ined.* t. 48.—Rhizome a large irregularly shaped tuberous mass. Stipes stout, 1-2 ft. long or more, brownish-green, jointed at the base and furnished with large clasping auricles which are persistent on the rhizome. Fronds large, in fully grown specimens 6-12 ft. long, 2-5 ft. broad, ovate-deltoid, dark-green and glossy, coriaceous, 2-pinnate or rarely 3-pinnate. Primary pinnæ 9 in. to 3 ft. long, often more than 1 ft. broad; pinnules shortly stalked, 3-6 in. long, $\frac{1}{2}$ -1 in. broad, lanceolate or oblong-lanceolate, acuminate, obliquely cuneate or rounded at the base; margins minutely serrulate; costa slightly scaly. Veins rather close, parallel, simple or sparingly forked. Sori oblong, brownish, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, on the veins just within the margin of the pinnules; sporangia 8-12 to each synangium.—*Hook. and Bak. Syn. Fil.* 440; *Benth. Fl. Austral.* vii. 695; *Thoms. N.Z. Ferns*, 97; *Field, N.Z. Ferns*, 153, t. 25, f. 5. *M. salicina*, Smith in *Rees Cyclop.* 89; *Hook. f. Fl. Nov. Zel.* ii. 49; *Handb. N.Z. Fl.* 386.

NORTH ISLAND: Lowland forests from Mongonui southwards to Cape Egmont and Waitotara, not common, usually in rich damp soils. *Para*; *Parareka*. Sea-level to 1000 ft.

The large starchy rhizome was formerly eaten by the Maoris, and hence the plant was occasionally cultivated near their villages. It is now fast becoming rare.

30. *OPHIOGLOSSUM*, Linn.

Rhizome usually short and suberect, sometimes slightly tuberous or nodose; roots thick and fleshy, simple, sometimes giving rise to adventitious buds. Fronds solitary or 2-3 at the top of the rhizome, not circinate, stipitate, fleshy, composed of

two portions: one a leafy more or less expanded sterile lamina, with reticulated venation; the other a narrow and much-contracted spike-like fertile part, which is inserted on the petiole or lamina of the sterile portion by a peduncle of variable length. Sporangia closely packed in 2 rows on the fertile spike and partly imbedded in its tissue, globose, not annulate, dehiscing by a transverse slit; spores numerous, tetrahedral.

A small genus, widely spread in both temperate and tropical regions. There is much uncertainty as to the limits of the species, which are estimated by some authors at 8-10, and by others at 30 or more. In the present work I have followed Mr. Baker in treating the New Zealand species as forms only of the northern *O. lusitanicum* and *O. vulgatum*; but in Prantl's revision of the genus, given in the Jahrbuch of the Botanical Garden of Berlin for 1884, an arrangement which is now largely followed by European botanists, they are considered to be distinct. Prantl's classification depends largely on characters drawn from the rhizome, the venation of the sterile frond, and the size of the spores, and is somewhat difficult to use in the absence of authenticated specimens.

Fronds $\frac{1}{2}$ -5 in.; sterile lamina $\frac{1}{4}$ -2 in. \times $\frac{1}{8}$ - $\frac{1}{3}$ in., linear-lanceolate to oblong-lanceolate, attenuated at the base.

Fertile spike $\frac{1}{4}$ - $\frac{3}{4}$ in.

1. *O. lusitanicum*.

Fronds 4-10 in.; sterile lamina $\frac{3}{4}$ -3 in. \times $\frac{1}{2}$ -1 $\frac{1}{2}$ in., ovate, shortly cuneate at the base. Fertile spike $\frac{3}{4}$ -1 $\frac{1}{2}$ in.

2. *O. vulgatum*.

1. *O. lusitanicum*, Linn. *Sp. Plant.* 1518.—Rhizome cylindric, suberect, slightly tuberous; roots fleshy. Fronds 1-3 from the rhizome, $\frac{1}{2}$ -5 in. long including the petiole and fertile spike; the sterile lamina usually placed below the middle and often conspicuously so, $\frac{1}{4}$ -2 in. long, $\frac{1}{8}$ - $\frac{1}{3}$ in. broad, linear-lanceolate to lanceolate or oblong-lanceolate, acute or obtuse, narrowed into a long cuneate base, fleshy and coriaceous. Veins indistinct, reticulated in narrow areoles. Fertile spike $\frac{1}{4}$ - $\frac{3}{4}$ in. long, on a long slender peduncle inserted at the base of the sterile lamina and much exceeding it when mature. Sporangia 6-15 in each row.—*Hook. and Bak. Syn. Fil.* 445; *Thoms. N.Z. Ferns*, 98; *Field, N.Z. Ferns*, 155, t. 21, f. 7. *O. vulgatum*, var. *gramineum*, *lusitanicum*, and *minimum*, *Hook. f. Fl. Nov. Zel.* ii. 50; *Handb. N.Z. Fl.* 386. *O. coriaceum*, *A. Cunn. Precur.* n. 161. *O. minimum*, *Col. ex Hook. and Bak. Syn. Fil.* 445. *O. minimum*, *Armstr. in Trans. N.Z. Inst.* xiii. (1881) 342.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Not uncommon throughout, ascending to 3500 ft.

This, so far as New Zealand is concerned, consists of the varieties *gramineum*, *lusitanicum*, and *minimum* of the *O. vulgatum* of the Flora and the Handbook. Prantl considered the first two to form a distinct species, for which he retained Cunningham's name of *O. coriaceum*. He further suggested that var. *minimum* might be identical with his *O. lanceolatum*, from northern Queensland, but without access to the original specimens it is impossible to decide. *O. coriaceum* is also found in Australia and South America.

2. *O. vulgatum*, Linn. *Sp. Plant.* 1518. — Rhizome short, cylindric, often knotty; roots long, fleshy. Fronds 1–2 from the rhizome, 4–12 in. long including the petiole and fertile spike; the sterile lamina placed near the middle or slightly below it, $\frac{3}{4}$ –3 in. long, $\frac{1}{2}$ –1½ in. broad, ovate or ovate-lanceolate or ovate-rhomboid, obtuse or subacute, truncate or cuneate at the base, rather fleshy, venation reticulated. Fertile spike $\frac{3}{4}$ –1½ in. long, on a slender peduncle inserted just below the sterile lamina and much overtopping it. Sporangia variable in number, 15–50 in each row.—*Hook. f. Fl. Nov. Zel.* ii. 50, and *Handb. N.Z. Fl.* 386 (in part); *Hook. and Bak. Syn. Fil.* 445; *Thoms. N.Z. Ferns*, 98; *Field, N.Z. Ferns*, 155, t. 21, f. 6. *O. costatum*, *R. Br. Prodr.* 163. *O. elongatum*, *A. Cunn. Precur.* n. 162.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: From the North Cape to Foveaux Strait, plentiful in moist grassy places, by the margins of swamps, &c. Sea-level to 2000 ft.

As defined by Hooker and Baker in the "Synopsis Filicum" this is almost cosmopolitan; but by many authors it is split up into a considerable number of species with a more restricted range. Most of the New Zealand forms correspond with *O. costatum*, *R. Br.* (*O. elongatum*, *A. Cunn.*), which is kept up as a distinct species by Prantl, under the name of *O. pedunculosum*, *Desv.*, and which ranges from New Zealand and Australia northwards to Malaya, Ceylon, India, Philippines, and Japan.

31. *BOTRYCHIUM*, Swartz.

Rhizome short, suberect, emitting numerous long fleshy branching roots. Fronds solitary or rarely two at the top of the rhizome, not circinate, stipitate, thick and fleshy, composed of two divisions: the posterior sterile, pinnate or 2–3-pinnate or decomposed; the anterior fertile, of numerous branched spikes forming a pedunculate panicle, the peduncle usually long, inserted on the petiole below the sterile lamina. Sporangia closely packed and sessile in two rows along the branches of the panicle, free, globose, not annulate, dehiscing by a transverse slit; spores numerous, tetrahedral.

Species variously estimated at from 6 to 15, according to the different views of authors. Found in most temperate or extratropical regions, rare in very hot climates. Both the New Zealand species are widely distributed.

Sterile segment of the frond simply pinnate; fertile bi-

pinnate	..	..	..	..	..	1. <i>B. lunaria</i> .
Sterile and fertile segments both decomposed	..	..	..	..	..	2. <i>B. ternatum</i> .

1. *B. lunaria*, Swartz, *Syn. Fil.* 171.—Rhizome short, tuberous. Fronds solitary at the top of the rhizome or rarely 2 together, 3–6 in. high; stipes stout, terete, glabrous, with 1 or 2 brownish sheathing scales at the base. Sterile lamina at about the middle of the frond, $\frac{3}{4}$ –3 in. long, $\frac{1}{2}$ –1 in. broad, oblong or linear-oblong, rather fleshy, simply pinnate; pinnæ 3–6 pairs, close-set, lunate or flabel-

late, entire or more or less deeply crenate-toothed. Veins flabellate, radiating from the base. Fertile segment equalling or exceeding the sterile, pedunculate, $\frac{1}{2}$ –3 in. long, lanceolate-deltoid, 2-pinnate; the divisions all turned to one side, narrow, thickly covered with the yellowish sporangia.—*Hook. f. Fl. Tasm.* 154; *Hook. and Bak. Syn. Fil.* 447; *Benth. Fl. Austral.* vii. 690; *Enys in Trans. N.Z. Inst.* xvi. (1884) 363; *Kirk, l.c.* 366; *Field, N.Z. Ferns*, 156, t. 21, f. 8.

SOUTH ISLAND: Canterbury—South-western slopes of Mount Torlesse, alt. 2700 ft., *J. D. Enys*!

Not uncommon in the temperate and cool mountainous portions of the Northern Hemisphere, and in Patagonia and Australia in the Southern. The few New Zealand specimens that I have seen are much under the average size of the species in Europe or North America, but I can see no other difference.

2. **B. ternatum**, *Swartz, Syn. Fil.* 172.—Rhizome short, stout, emitting numerous long and fleshy almost tuberous roots. Fronds solitary, 6–18 in. long or more. Stipes 1–3 in. long from the rhizome to the forking of the sterile and fertile segments, stout, thick and fleshy, terete. Sterile segment long-peduncled, variable in size, usually from 3–6 in. broad and long, but large specimens sometimes reach 9–12 in., and small ones are often dwarfed to less than 2 in., broadly deltoid, tripartite at the base, the divisions usually petiolate, 2–4-pinnate; the ultimate pinnules oblong or ovate, toothed or crenate or almost entire; texture thick and fleshy. Fertile segment on a stout or slender peduncle 4–12 in. long or more, usually overtopping the sterile segment; panicle $1\frac{1}{2}$ –6 in. long, nearly as broad at the base, much branched, 3–4-pinnate. Sporangia very numerous.—*Hook. and Bak. Syn. Fil.* 448; *Benth. Fl. Austral.* vii. 690; *Thoms. N.Z. Ferns*, 99; *Field, N.Z. Ferns*, 157, t. 20, f. 5, 5A. *B. virginianum*, *Hook. f. Fl. Nov. Zel.* ii. 50 (not of *Swartz*). *B. cicutarium*, *Hook. f. Handb. N.Z. Fl.* 387 (not of *Swartz*). *B. australe*, *R. Br. Prodr.* 164; *A. Cunn. Precur.* n. 160; *Raoul, Choix*, 37; *Prantl, Syst. Ophiogl.* 340.

Var. dissectum.—Frond more slender; sterile segment much more finely divided, the ultimate pinnules laciniately cut into narrow lobes and teeth.—*B. dissectum*, *Muhl. ex Willd. Sp. Plant.* v. 64. *B. australe* var. *millefolium*, *Prantl, Syst. Ophiogl.* 341. *B. biforme*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 223.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: The ordinary form abundant from the North Cape to the south of Otago; var. *dissectum* often local. Sea-level to 3500 ft.

Also in extratropical North America, Asia, and in Australia and Tasmania. Very variable throughout its range, and separated by Prantl and other authorities into 7 or 8 distinct species, the New Zealand forms being placed under *B. australe*, *R. Br.*

ORDER XCIV. **MARSILEACEÆ.**

Perennial plants, usually of small size, growing in marshes or in damp soil. Rhizome slender, creeping, rooting at the nodes. Leaves solitary or in tufts at the nodes of the rhizome, either filiform or of 4 leaflets borne at the top of a slender petiole. Sporocarps or conceptacles globose or oblong, on short peduncles which rise from the petioles or near their bases, each sporocarp containing numerous (*Marsilea*) or few (*Pilularia*) cavities or cells, and each cell containing a group or sorus composed of macrosporangia and microsporangia. Macrosporangia containing a single macrospore; microsporangia containing numerous microspores.

A small order of 2 genera and 50 or 60 species, found in most temperate and tropical countries. In germination a small female prothallium is developed within the macrospore, which eventually bursts, the prothallium protruding from the opening. A single archegonium is then formed on the prothallium, which is fertilised by spermatozoids set free by the bursting of the microspores, within which a rudimentary male prothallium bearing a single antheridium has been developed.

1. **PILULARIA**, Linn.

Rhizome long, filiform, creeping and rooting. Leaves solitary at the nodes of the rhizome, circinate in veneration, filiform, erect. Sporocarps on short peduncles, globose, 2-4-celled, splitting at the top into as many valves as cells; each cell with a longitudinal parietal placenta bearing in the upper portion microsporangia containing numerous microspores, and below these few or many macrosporangia containing a solitary macrospore.

A small genus of 6 species, found in the temperate or subtropical regions of both hemispheres. The New Zealand species is endemic.

1. **P. novæ-zealandiæ**, *T. Kirk in Trans. N.Z. Inst.* ix. (1877) 547, t. 29.—Very slender. Leaves distant, $\frac{3}{4}$ –2 in. long. Peduncle about $\frac{1}{4}$ in. long, erect. Sporocarp $\frac{1}{8}$ in. diam., globose, densely hairy, 2-celled and 2-valved. Macrosporangia 10–12 to each cell, subglobose, not constricted at the middle.—*Thoms. N.Z. Ferns*, 100; *Bak. Fern Allies*, 148.

NORTH ISLAND: Auckland—Lake Whangape, *Kirk*. SOUTH ISLAND: Canterbury—Lake Lyndon, Lake Pearson, and other lakes in the Waimakariri district, *Kirk*! *Enys*! *Berggren*, *T. F. C.*

Probably not an uncommon plant, but very easily overlooked.

ORDER XCV. **SALVINIACEÆ.**

Fugacious annuals, of small size, floating in quiet waters. Stems simple or branched. Leaves small, often minute, apparently distichous, sessile or shortly petiolate, simple or lobed. Sporocarps or conceptacles on the under-surface of the stem, either clus-

tered on the divisions of an altered submerged leaf, or in pairs in the axils of the leaves, globose or ovoid, membranous, indehiscent, of two kinds, both borne on the same plant; one kind containing a single or many macrosporangia, the other enclosing numerous microsporangia. Macrosporangia containing a single macrospore; microsporangia with numerous microspores.

Genera 2; species about 18, mainly tropical or subtropical. In germination the macrospore produces a rather large prothallium, which remains attached to it, and which bears one or more archegonia. The microspores each develop a rudimentary prothallium bearing a single antheridium containing spermatozoids, fertilisation taking place in the same way as in ferns. In the genus *Salvinia*, which is not found in New Zealand, the antheridia are formed while the microspores are contained within the microsporangium; but in *Azolla* the microspores escape in groups called massulæ, each with its proper membrane, and the antheridia are developed within the massulæ.

1. AZOLLA, Linn.

Floating water-plants. Stems copiously pinnately branched, emitting on the under-side numerous rootlets. Leaves densely imbricating, very minute, sessile, deeply and unequally 2-lobed. Sporocarps or conceptacles in pairs in the axils of the leaves on the under-surface of the stem, of two kinds: one kind larger, globose, enclosing numerous microsporangia, each of which contains numerous microspores arranged in separate groups or massulæ furnished with a membranous envelope; the other smaller, ovoid, containing a single macrosporangium within which is a solitary macrospore. Macrospores each crowned with few or many swimming-floats; massulæ of the microspores armed with simple or hooked bristles.

A small genus of 4 or 5 species, found in most tropical or warm temperate regions.

1. *A. rubra*, *R. Br. Prodr.* 167. — Floating, red or reddish-green, often gregarious and covering large sheets of water; the separate plants $\frac{1}{2}$ –1 in. long, orbicular or ovate or somewhat deltoid, copiously bipinnate. Leaves densely imbricating, about $\frac{1}{20}$ in. long, 2-lobed, the lobes ovate, obtuse. Larger sporocarps globose, about $\frac{1}{20}$ in. diam.; the massulæ of the microspores armed with copious hooked bristles. Smaller sporocarps hardly more than half the size, oblong; the solitary macrospore crowned with 3 swimming-floats. — *Hook. f. Fl. Nov. Zel.* ii. 56; *Handb. N.Z. Fl.* 392; *Benth. Fl. Austral.* vii. 680; *Bak. Fern Allies*, 137.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant in still waters throughout.

Also found in Australia and Tasmania, and very closely allied to the South American *A. filiculoides*, Lam., of which some authors consider it to be a variety.

ORDER XCVI. **LYCOPODIACEÆ.**

Perennials, from a few inches to a few feet high. Stems erect or pendulous, or prostrate or creeping, simple or more usually dichotomously branched, often hard and wiry, usually leafy throughout. Leaves small, simple, entire or serrulate, more or less decurrent at the base, indistinctly 1-nerved, either spreading all round the axis and of the same shape and size, or dimorphous with the larger ones distichously spreading. Sporangia all of one kind, coriaceous, 1-celled in the typical genera, 2-3-4-celled in *Tmesipteris* and *Psilotum*, borne singly on the upper base of fertile leaves or sporophylls. Sporophylls either similar to the foliage-leaves and placed all down the stem, or more or less reduced in size and bract-like and aggregated into terminal spikes or cones, in *Tmesipteris* and *Psilotum* deeply bifid with the sporangia attached below the fork. Spores all of one kind, numerous, tetrahedral, marked with 3 radiating lines at the tip.

An order containing 4 genera and over 100 species, quite cosmopolitan in its distribution, and without any important economical properties or uses. The germination of the spores has so far been observed in a very small proportion of the species. The prothallium is monœcious, as in ferns, producing both archegonia and antheridia, but the species which have been examined exhibit great diversities in the shape and mode of growth of the prothallium and in its duration; and considerable variety also exists in the development of the embryonic plant. For particulars reference must be made to special text-books or memoirs. As a matter of convenience, I have retained *Tmesipteris* and *Psilotum* in the order, but the structure of the sporangia and form of the sporophylls are so distinct that there can be little doubt that Pritzel and other authors are right in placing them in a distinct order.

A. Lycopodiinæ. Fertile leaves or sporophylls (bracts) simple, not forked. Sporangia reniform, compressed, 1-celled, dehiscing by a longitudinal slit.

Minute. Stem reduced to a small tuber crowned by subulate leaves. Sporangia forming a cone-like spike at the top of a naked peduncle 1. PHYLLOGLOSSUM.

Larger. Stem conspicuous, branched, leafy throughout. Sporangia collected into terminal or lateral spikes, rarely scattered along the branches 2. LYCOPIDIUM.

B. Psilotinæ. Fertile leaves or sporophylls forked. Sporangia (synangia) 2-3-4-celled and valved, attached to the sporophylls below the fork.

Stems simple or rarely forked. Leaves conspicuous, vertical. Synangia boat-shaped, 2-celled 3. TMESIPTERIS.

Stems many times dichotomous. Leaves minute, scale-like. Synangia subglobose, usually 3-celled 4. PSILOTUM.

1. **PHYLLOGLOSSUM**, Kunze.

A small stemless plant, consisting of an oblong tuber (protocorm) which is annually reproduced, and which bears at its apex a tuft of terete subulate leaves. Roots few, simple, springing from above the tuber directly below the leaves. Peduncle arising from the apex of the tuber and surrounded at its base by the leaves,

short, erect, simple or very rarely forked, ending in a short fertile spike or cone. Bracts several, imbricated, broadly ovate, cuspidate, each supporting a single reniform 1-celled sporangium, which dehisces by a longitudinal slit. Spores small, numerous, with three lines radiating from the apex.

A genus of a single species, found in New Zealand, Tasmania, Victoria, and West Australia.

1. **P. Drummondii**, Kunze in *Bot. Zeit.* (1843) 721.—Whole plant 1–2½ in. high, green, perfectly glabrous. Tuber small, oblong, producing another (rarely two more) during the growing season, the new tuber remaining dormant during the summer and reproducing the plant the following winter, the original tuber and its leaves shrivelling after the ripening of the sporangia. Leaves usually from 4–10, but varying in number from 1 or 2 to 15 or even 20, $\frac{1}{3}$ – $\frac{3}{4}$ in. long, linear-subulate, acute, fleshy, cylindrical. Peduncle 2 or 3 times as long as the leaves, stout, erect. Spike $\frac{1}{8}$ – $\frac{1}{3}$ in. long, oblong-ovoid, terete; bracts 10–30, broad, the erect cusp overtopping the sporangium.—*Hook. Ic. Plant.* 908; *Hook. f. Fl. Nov. Zel.* ii. 51; *Fl. Tasm.* ii. 154; *Handb. N.Z. Fl.* 388; *Bak. Fern Allies*, 7; *Thoms. N.Z. Ferns*, 102. *Lycopodium sanguisorba*, *Sprng. Monog. Lycop.* ii. 36.

NORTH ISLAND: Barren clay hills from the North Cape to the Thames Valley and the Middle Waikato (Lake Waikare), not uncommon. SOUTH ISLAND: Said to have been gathered near Picton by *Helms*, and on Banks Peninsula by *Armstrong*, but I have seen no specimens.

A remarkable little plant, differing from all other *Lycopods* in its vegetative characters, but with the spike and sporangia of *Lycopodium*. The tuber and its leaves are so similar in appearance and mode of development to the embryonic plant of some species of *Lycopodium*, and notably to that of *L. cernuum*, with its protocorm or embryonic tubercle, and protophylls or primordial leaves, that both Bower and Treub expressed the opinion that *Phylloglossum* should be regarded as a permanently embryonic form of *Lycopod*. The important discovery recently made by Thomas that the prothallium and development of the embryo is of the same type as that of *Lycopodium cernuum* may be regarded as a satisfactory proof of the correctness of this view; and it seems in every way probable that Thomas is correct in considering *Phylloglossum* to be the most primitive of existing *Lycopodiaceæ*. For information on the subject the student should consult Professor Bower's two memoirs "On the Development and Morphology of *Phylloglossum Drummondii*" and "On the Morphology of the Spore-producing Members" (*Trans. Roy. Soc.* 1886, p. 665, and 1894, p. 508–510); also Treub's paper in the *Annals of the Bot. Garden of Buitenzorg*, Vol. viii., p. 1 *et seq.*; and Professor Thomas's "Preliminary Account of the Prothallium of *Phylloglossum*" (*Proc. Roy. Soc.*, Vol. lxi., p. 285–291, reprinted in *Trans. N.Z. Inst.* xxxiv. 402–408).

2. LYCOPODIUM, Linn.

Stems erect or pendulous, or prostrate and creeping, copiously branched, rarely simple, often hard and wiry, usually leafy throughout. Leaves small, crowded or imbricate, 1-nerved, entire or denticulate, generally uniform in size and multifarious, but in a few species dimorphous and distichous. Sporangia 1-celled, reniform,

compressed, coriaceous, dehiscing by a longitudinal slit, placed singly on the upper surface of the leaves near their base, or more generally at the upper base of imbricated bracts aggregated into terminal spikes, which are either sessile or pedunculated. Spores small, numerous, with three lines radiating from the apex.

A large genus of about 100 species, found in all parts of the world. Of the 11 species indigenous in New Zealand, 3 are widely distributed in both hemispheres, 6 extend to Australia, 2 of them reaching the Pacific islands as well, the remaining 1 or 2 are endemic.

A. *Selago*. Leaves multifarious. Sporangia at the upper base of unaltered leaves at intervals all down the stem.

Stems 3-12 in., tufted, erect, dichotomously forked. Leaves crowded, erect, subulate-lanceolate, $\frac{1}{8}$ - $\frac{1}{4}$ in. long .. 1. *L. Selago*.

B. *Lepidotis*. Leaves multifarious. Sporangia aggregated into distinct terminal spikes, at the upper base of bracts differing in shape and size from the leaves.

* Epiphytic or rupestral, rarely terrestrial. Stems often pendulous, dichotomously forked from the base. Spikes slender, tetragonous.

Stems 6-24 in., usually erect, stout, rigid. Spikes 2-6 in., stout, curved; bracts about $\frac{1}{8}$ in., the upper decidedly longer than the sporangia 2. *L. varium*.

Stems 1-5 ft., pendulous, very slender. Spikes 1-4 in.; bracts $\frac{1}{10}$ - $\frac{1}{2}$ in., the upper scarcely longer than the sporangia 3. *L. Billardieri*.

** Stems erect, rigid, dendroid, simple below, copiously branched above. Spikes terminal, sessile, cylindrical.

Stems 1-3 ft.; branches ascending, dense, fastigiate. Spikes $\frac{1}{2}$ -1 in., erect; bracts broadly ovate, acute but not cuspidate 4. *L. densum*.

Stems $\frac{3}{4}$ -2 ft.; branches spreading. Spikes $\frac{1}{4}$ - $\frac{1}{2}$ in., incurved or pendulous; bracts broadly ovate with a long cuspidate point 5. *L. cernuum*.

*** Stems slender, erect or procumbent, sparingly or diffusely branched. Spikes lateral or terminal on short lateral branchlets.

Stems 4-18 in., erect, simple or dichotomously forked; branches erect. Spikes lateral, sessile, $\frac{1}{2}$ - $\frac{3}{4}$ in. long .. 6. *L. laterale*.

Stems 2-9 in., procumbent or prostrate, much branched, often with the branches interlaced. Spikes terminating short lateral branchlets 7. *L. ramulosum*.

**** Main stem creeping, with erect or ascending branches. Spikes terminal, on long peduncles.

Stems 2-6 in., creeping and rooting, leafy; fertile branches or peduncles simple, strict, erect, 2-6 in. long. Spikes $\frac{1}{2}$ - $\frac{3}{4}$ in. 8. *L. Drummondii*.

Stems 6-24 in., creeping; branches 3-14 in., erect or ascending, fastigiate branched. Spikes $\frac{3}{4}$ -2 in. long, on peduncles terminating the upper branchlets .. 9. *L. fastigiatum*.

C. Diphasium. Leaves distichous and dimorphous. Sporangia aggregated into distinct terminal spikes; bracts small.

Stems 1-3 ft., creeping; branches 3-12 in., ascending or erect, flattened. Spikes 1-2 in., solitary, terminal; bracts with spreading tips 10. *L. scariosum*.

Stems 2-8 ft., scrambling or climbing; branches flabellately divided, flattened. Spikes 1-4 in., in large panicles at the ends of the branches; bracts with small appressed tips 11. *L. volubile*.

1. *L. Selago*, Linn. *Sp. Plant.* 1565.—Stems 3-12 in. long, usually shortly decumbent and rooting at the base, erect above, several times dichotomously forked, densely leafy throughout; branches 2-9 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam. including the leaves, stout, rigid, erect, cylindric, often uniform in height and forming dense level-topped tufts. Leaves crowded, ascending or rarely spreading, $\frac{1}{6}$ – $\frac{1}{4}$ in. long, subulate-lanceolate, acuminate, sometimes almost pungent, quite entire or minutely denticulate, firm, dark-green and glossy, sometimes with pedicelled leafy bulbils in the axils. Sporangia solitary on the upper surface of the unaltered leaves near their base, often at intervals all down the stem, but usually most abundant in the upper part, not forming a distinct spike.—*Hook. f. Fl. Nov. Zel.* ii. 52; *Fl. Tasm.* ii. 155, t. 170A; *Handb. N.Z. Fl.* 389; *Benth. Fl. Austral.* vii. 674; *Bak. Fern Allies*, 9; *Thoms. N.Z. Ferns*, 103.

NORTH ISLAND: Mountainous districts from Mount Tauhara (near Lake Taupo) southwards to the Tararua Range, apparently local. SOUTH ISLAND, STEWART ISLAND: Abundant in mountain districts, usually between 1500 and 5000 ft., but descends almost to sea-level in Stewart Island.

An abundant plant on moors and heaths in cool or damp mountainous localities throughout the world.

2. *L. varium*, R. Br. *Prodr.* 165.—Rhizome stout. Stems tufted, $\frac{1}{2}$ –2 ft. long, stout, rigid, erect or more rarely pendulous, sparingly or much dichotomously branched, leafy throughout; branches stout, often curved. Leaves crowded all round the branches, ascending or spreading, the lower ones the longest, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, lanceolate, obtuse or subacute, coriaceous, dark-green and glossy, midrib usually obscure; upper leaves smaller and more appressed. Spikes terminal, usually numerous, simple or branched, curved or drooping, tetragonous, 2-6 in. long, $\frac{1}{8}$ – $\frac{1}{6}$ in. diam. Bracts densely imbricating, about $\frac{1}{5}$ in. long, broadly ovate, acute or obtuse, keeled; the lower ones rather longer and more foliaceous, gradually passing into the upper leaves, the upper decidedly longer than the reniform sporangia.—*Hook. and Grev. Ic. Fil.* t. 112; *Hook f. Fl. Antarct.* i. 115; *Fl. Nov. Zel.* ii. 52; *Fl. Tasm.* ii. 155, t. 170B; *Handb. N.Z. Fl.* 389; *Benth. Fl. Austral.* vii. 674; *Bak. Fern Allies*, 21; *Thoms. N.Z. Ferns*, 104.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Mountainous districts from the Great Barrier Island and Cape Colville southwards, not uncommon. Sea-level to 4500 ft.

Also in Australia and Tasmania. Probably only an extreme form of *L. Billardieri*, into which it passes by imperceptible gradations, but in its usual state distinguished without much difficulty by the stout rigid habit, stouter curved spikes, and larger bracts. It is usually terrestrial or rupestral, rarely epiphytic.

3. *L. Billardieri*, *Spring. Monog. Lycop.* i. 56.—Rhizome short. Stems tufted, pendulous from the branches of trees or from rocks, 1–5 ft. long, excessively dichotomously branched from the base upwards, slender, cylindric, dark-green, leafy throughout; upper branches almost flaccid. Lower leaves laxly placed, spreading or ascending from an erect decurrent base, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, linear or linear-ligulate, obtuse or acute, coriaceous, usually with a distinct midrib; upper shorter and more closely placed, more erect, often appressed and imbricating, $\frac{1}{4}$ in. long, linear-subulate, acute, more or less keeled. Spikes terminating the branches, very numerous, slender, dichotomously forked, tetragonous, 1–4 in. long, $\frac{1}{12}$ – $\frac{1}{10}$ in. diam. Bracts densely imbricating, short, $\frac{1}{5}$ – $\frac{1}{15}$ in. long, broadly ovate, acute or apiculate, keeled, the upper ones sometimes no longer than the reniform sporangia.—*Hook. f. Fl. Nov. Zel.* ii. 53; *Handb. N.Z. Fl.* 389; *Baker, Fern Allies*, 20; *Thoms. N.Z. Ferns*, 104. *L. varium* var. *Billardieri*, *Kirk in Trans. N.Z. Inst.* xvi. (1884) 377. *L. flagellaria*, *A. Rich. Fl. Nouv. Zel.* 60 (not of Bory); *A. Cunn. Precur.* n. 155; *Raoul, Choix*, 37. *L. Phlegmaria*, *A. Cunn. Precur.* n. 157 (not of Linn).

Var. *gracile*, *Kirk in Trans. N.Z. Inst.* xvi. (1884) 377.—Stems tufted, 6–12 in. high, slender, pale-green, flaccid. Leaves spreading, about $\frac{1}{2}$ in. long, narrow-linear, acute or obtuse. Spikes lax, slender, 3–6 in. long, simple or forked. Bracts about $\frac{1}{4}$ in. long, linear, spreading or ascending, 3 or 4 times as long as the sporangia.—(?) *L. novæ-zealandicum*, *Col. in Trans. N.Z. Inst.* xix. (1887) 275.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: The typical form abundant in woods from the North Cape to Foveaux Strait. Var. *gracile*: Mount Egmont, *T. F. C.*; Wairarapa Valley, *J. S. Sandager*; Maitai Valley, *Dr. Boor* and *T. Kirk*; Westport, *Dr. Gaze*; Otira Gorge, *T. F. C.* Sea-level to 2000 ft.

Either the same or a closely allied species is found in Tahiti and others of the Polynesian islands.

4. *L. densum*, *Labill. Pl. Nov. Holl.* ii. 104, t. 251.—Rhizome short, stout, creeping. Stems rigidly erect, woody, dendroid, 1–3 ft. high, simple below, much and densely fastigiately branched above; branches repeatedly divided; branchlets slender, ascending, $\frac{1}{16}$ – $\frac{1}{8}$ in. diam. Leaves inserted all round the stem and branches, distant towards the base of the stem, densely imbricating above, erect, closely appressed, $\frac{1}{20}$ – $\frac{1}{12}$ in. long, subulate-lanceolate, shortly aristate; in young or sterile plants often larger, squarrose or erectopate. Spikes solitary and terminal on the branchlets, very numerous, erect, $\frac{1}{2}$ –1 in. long, about $\frac{1}{8}$ in. diam., cylindric, obtuse.

Bracts close-set, broadly ovate, acute but not cuspidate, spreading when mature; margins scarious, jagged. Spores echinate.—*A. Cunn. Precur.* n. 153; *Raoul, Choix*, 37; *Hook. f. Fl. Nov. Zel.* ii. 53; *Handb. N.Z. Fl.* 389; *Benth. Fl. Austral.* vii. 676; *Bak. Fern Allies*, 24; *Thoms. N.Z. Ferns*, 105.

NORTH ISLAND: Abundant from the North Cape to Poverty Bay and Kawhia, usually in light scrub on clay soils. SOUTH ISLAND: Marlborough, *Buchanan*. CHATHAM ISLANDS: *Dieffenbach*. Sea-level to 3000 ft.

Also in Norfolk Island, Australia and Tasmania, and New Caledonia.

5. *L. cernuum*, *Linn. Sp. Plant.* 1566.—Stems stout, creeping, 1–3 ft. long, leafy throughout; primary branches rigidly erect, 9–18 in. long or more, much branched in the upper portion, usually simple below; lower branchlets copiously divided, short, spreading or ascending, pendulous towards the tips. Leaves inserted all round the stems and branches, crowded, squarrose or incurved towards the tips, $\frac{1}{10}$ – $\frac{1}{8}$ in. long, narrow linear-subulate, decurrent at the base, pale soft-green, keeled by the prominent midrib beneath. Spikes numerous, solitary and sessile on the incurved or pendulous tips of the branchlets, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong, obtuse, cylindric. Bracts imbricating all round, broadly ovate, narrowed into a long cuspidate point; margins denticulate.—*A. Cunn. Precur.* n. 154; *Raoul, Choix*, 37; *Hook. f. Fl. Nov. Zel.* ii. 54; *Handb. N.Z. Fl.* 390; *Benth. Fl. Austral.* vii. 676; *Bak. Fern Allies*, 23; *Thoms. N.Z. Ferns*, 105. (?) *L. polycephalum*, *Col. in Trans. N.Z. Inst.* xxvii. (1895) 401.

KERMADEC ISLANDS: Sunday Island, in the large crater-basin, not common, *T. F. C.* NORTH ISLAND: From the North Cape to the East Cape and Taupo, abundant to the north of the Thames and Waikato Rivers, and in great profusion in heated soil in the thermal-springs district, from Rotorua to Taupo. Sea-level to 2500 ft.

A common tropical plant all round the world. Frequently luxuriating in the neighbourhood of hot springs.

6. *L. laterale*, *R. Br. Prodr.* 165.—Rhizome long, stout, white, creeping. Stems numerous, erect or decumbent at the base, 4–18 in. high, stout or slender, simple or sparingly branched, the branches erect, cylindric, pale-green, sometimes tinged with reddish-brown, leafy from the base. Leaves close-set, spreading all round or the upper ascending, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, subulate-lanceolate, acuminate, decurrent at the base, firm but hardly coriaceous; midrib evident; margins revolute. Spikes 2–8 to a branch, lateral, sessile, simple, erect, $\frac{1}{3}$ – $\frac{2}{3}$ in. long, oblong, obtuse, often brown or reddish-brown. Bracts imbricated, spreading at maturity, broadly ovate, suddenly narrowed into a rather long acuminate point; margins jagged.—*A. Cunn. Precur.* n. 156; *Raoul, Choix*, 37; *Hook.*

f. Fl. Nov. Zel. ii. 53; *Handb. N.Z. Fl.* 389; *Benth. Fl. Austral.* vii. 675; *Bak. Fern Allies*, 28; *Thoms. N.Z. Ferns*, 106. *L. consimilis*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 348.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant in swampy or peaty ground throughout. Sea-level to 2500 ft.

Also found in Australia, from Queensland to Victoria, and in New Caledonia.

7. *L. ramulosum*, *T. Kirk in Trans. N.Z. Inst.* xi. (1879) 456, t. 19B.—Rhizome creeping, branched. Stems 2–9 in. long, prostrate or procumbent, usually much branched and densely intermatted, but sometimes lax and open; branches ascending at the tips, pale-green, often tinged with reddish, leafy throughout. Leaves rather close, spreading or ascending, about $\frac{1}{8}$ in. long, subulate-lanceolate, mucronate, decurrent at the base, keeled, firm but scarcely coriaceous, quite entire. Spikes solitary and sessile at the end of short leafy branchlets, sometimes terminating the main branches; occasionally the branches are so much reduced that the spike becomes lateral as in *L. laterale*, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong, obtuse, brown or reddish-brown. Bracts imbricated, ascending, broadly ovate, abruptly acuminate or cuspidate, coriaceous; margins entire or slightly toothed.—*Bak. Fern Allies*, 25; *Thoms. N.Z. Ferns*, 105.

SOUTH ISLAND: Nelson—Vicinity of Westport, *W. Townson*! Westland—Near Hokitika, *W. Tipler*; Kumara, *J. W. Brame*! Okarito, *A. Hamilton*! STEWART ISLAND: Paterson's Inlet, *Kirk*! Usually in open peaty land or in swampy woods. Sea-level to 2000 ft.

Differs from *L. laterale* and the Australian *L. diffusum* in the procumbent and densely matted habit, and in the usually terminal spikes.

8. *L. Drummondii*, *Spring. Monog. Lycop.* ii. 35.—“Main stem trailing, branched, 2–4 in. long or more, sending out rootlets and distant stiffly erect simple fertile branches 2–6 in. long. Leaves of trailing stem crowded, lanceolate, ascending, much imbricated, glossy, pale-green, entire, firm in texture, $\frac{1}{8}$ in. long; midrib obscure; those of the peduncle much laxer, stiffly erecto-patent, very decurrent. Spikes simple, $\frac{1}{2}$ – $\frac{1}{3}$ in. long, sometimes interrupted; bracts rigid, deltoid-cuspidate, erecto-patent, greenish-yellow, $\frac{1}{12}$ – $\frac{1}{8}$ in. long.”—*Bak. Fern Allies*, 19. *L. carolinianum*, *Hook. f. Fl. Nov. Zel.* ii. 54; *Handb. N.Z. Fl.* 390; *Benth. Fl. Austral.* vii. 675; *Thoms. N.Z. Ferns*, 106 (not of *Linn.*). *L. serpentinum*, *Kunze in Pl. Preiss.* ii. 108.

NORTH ISLAND: Auckland—North Cape district, in some locality between Ahipara and Cape Maria van Diemen, *Colenso*.

This has not been collected since its first discovery by Mr. Colenso in 1839, and in the absence of further information I have reproduced the description given by Mr. Baker in his “*Fern Allies*.” It is also found in Australia, and is very closely allied to the tropical *L. carolinianum*, *Linn.*, principally differing in the stem-leaves being all similar, and not dimorphic.

9. *L. fastigiatum*, *R. Br. Prodr.* 165.—Main stem or rhizome stout, creeping, subterranean, 6–24 in. long or more; primary branches rather distant, 3–14 in. long, stout, erect, rigid, often naked below, copiously fastigiately branched above; branchlets crowded. Leaves imbricated all round the branches, crowded, spreading and then incurved at the tips, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, linear or linear-lanceolate, acute or shortly mucronate, not hair-pointed, entire, firm, midrib indistinct. Spikes peduncled, often two together, terminating the upper branchlets or several in a central panicle, $\frac{3}{4}$ –2 in. long, rarely more, about $\frac{1}{8}$ in. diam., erect, cylindric. Bracts closely imbricate, broadly ovate at the base, narrowed upwards into a long spreading or recurved cuspidate point.—*Bak. Fern Allies*, 27. *L. clavatum* var. *magellanicum*, *Hook. f. Fl. Antarct.* i. 113; *Fl. Nov. Zel.* ii. 54; *Handb. N.Z. Fl.* 390; *Thoms. N.Z. Ferns*, 106, but scarcely *L. magellanicum*, *Swartz.* *L. clavatum* var. *fastigiatum*, *Benth. Fl. Austral.* vii. 675. *L. curvifolium* and *L. scopulosum*, *Col. in Trans. N.Z. Inst.* xx. (1888) 234, 235. *L. decurrens*, *Col. l.c.* xxviii. (1896) 617.

NORTH ISLAND: Hilly and mountainous localities from Cape Colville to Cook Strait, but local to the north of the East Cape. SOUTH ISLAND, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND: Abundant throughout. Sea-level to 5000 ft.

Also in Victoria and Tasmania, and very close to some forms of the widely distributed *L. clavatum*, *Linn.*, from which it is chiefly distinguished by the absence of hair-points to the leaves and their entire margins.

10. *L. scariosum*, *Forst. Prodr.* n. 484.—Main stems prostrate or creeping, stout, branched, 1–3 ft. long; branches numerous, rigid, erect or ascending, copiously divided, 3–12 in. long; branchlets flattened, $\frac{1}{8}$ – $\frac{1}{6}$ in. broad including the leaves. Leaves of the main stem inserted all round, appressed, lanceolate or subulate-lanceolate, with acute scarious tips; of the branchlets dimorphous, the larger distichously spreading and flattened, about $\frac{1}{8}$ in. long, ascending, much decurrent at the base, lanceolate or ovate-lanceolate, acute or acuminate, falcate, coriaceous, dark-green or yellow-green; smaller leaves on one side of the branchlets, subulate-lanceolate, appressed, usually with scarious tips. Spikes solitary at the end of the branchlets, 1–2 in. long, about $\frac{1}{8}$ in. diam., on long or short peduncles clothed with appressed imbricate leaves. Bracts closely imbricated, broadly ovate at the base, narrowed upwards into a long spreading or recurved scarious tip; margins often toothed.—*Hook. Ic. Plant.* t. 966; *Raoul, Choix*, 37; *Hook. f. Fl. Antarct.* i. 112; *Fl. Nov. Zel.* ii. 55; *Handb. N.Z. Fl.* 390; *Benth. Fl. Austral.* vii. 676; *Bak. Fern Allies*, 29; *Thoms. N.Z. Ferns*, 107. *L. Lessonianum*, *A. Rich. Fl. Nouv. Zel.* 59; *A. Cunn. Precur.* n. 152. *L. distans*, *Col. in Trans. N.Z. Inst.* xx. (1888) 236.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: From the Great Barrier Island and the Manukau Harbour southwards, but often local. Sea-level to 5000 ft.

A handsome and distinct species, a slightly different form of which is found in Victoria and Tasmania. It is also very closely allied to the South American *L. Jussiei*, Desv.

11. *L. volubile*, Forst. *Prodr.* n. 482.—Stems 2–8 ft. long or more, branched, scrambling over bushes or rocks, slender, wiry, flexuose, with distant minute linear-subulate appressed leaves. Branches numerous, leafy, compressed, pinnately or flabellately decomposed; branchlets forked, the ultimate ones $\frac{1}{2}$ –3 in. long, $\frac{1}{8}$ – $\frac{1}{4}$ in. broad including the leaves. Leaves dimorphous, the larger distichously spreading, $\frac{1}{8}$ – $\frac{1}{6}$ in. long, with a broad adnate decurrent base, ascending, lanceolate, strongly falcate, acuminate, midrib evident, oblique, texture firm; smaller leaves much reduced in size, linear, appressed. Spikes very numerous, 1–4 in. long, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, cylindrical, pendulous, arranged in large terminal much-branched panicles 6–24 in. long. Bracts imbricating, small, not much longer than the sporangia, broadly ovate or almost orbicular, suddenly narrowed into an erect subulate point.—*A. Cunn. Precur.* n. 158; *Raoul, Choix*, 37; *Hook. and Grev. Ic. Fil.* t. 170; *Hook. f. Fl. Nov. Zel.* ii. 55; *Handb. N.Z. Fl.* 391; *Benth. Fl. Austral.* vii. 677; *Bak. Fern Allies*, 29; *Thoms. N.Z. Ferns*, 107; *L. D'Urvillei, A. Rich. Fl. Nouv. Zel.* 60 (not of Bory).

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, usually forming entangled masses among low scrub. Sea-level to 3000 ft. *Waewaekoukou*.

By far the most beautiful species of the genus. It extends to Polynesia, New Caledonia, North Australia, the mountains of New Guinea, Java, Borneo, and the Malay Peninsula.

3. *TMESIPTERIS*, Bernh.

Rhizome creeping, sparingly branched; true roots wanting. Stems simple or rarely forked, pendulous or ascending, leafy. Leaves vertically placed, of two kinds; the foliage-leaves sessile and decurrent, simple and entire; the fertile leaves or sporophylls mixed with the foliage-leaves and about the same size, shortly petiolate, bipartite. Sporangia (or synangia) attached to the petiole of the fertile leaf just below the lobes, boat-shaped or spindle-shaped, coriaceous, pointed at both ends, slightly constricted about the middle, 2-celled with the septum across the narrow diameter, dehiscing longitudinally; rarely the sporangia are 3-celled or 1-celled. Spores minute, oblong.

A genus consisting of one highly variable species, found in New Zealand, Australia and Tasmania, and some of the Pacific islands. By some authors it is split up into 3 or 4, distinguished mainly by the shape of the apex of the leaf (which I find to be variable even in the same individual) and by certain histological details, the constancy of which has yet to be established.

1. **T. tannensis**, Bernh. in Schrad. Journ. Bot. ii. (1800) 131, t. 2.—Stems 4–18 in. long or more, simple or rarely once or twice forked, usually pendulous, slender, naked towards the base. Foliage-leaves rather closely placed, $\frac{1}{3}$ –1 in. long, obliquely oblong or oblong-lanceolate, sessile and strongly decurrent at the base, obtuse or truncate or acute at the tip, the midrib usually produced into a mucro of variable length, coriaceous, dark dull-green. Fertile leaves rather shorter than the foliage-leaves and replacing them at intervals down the stem, on short petioles sometimes $\frac{1}{4}$ in. long, deeply 2-partite, the divisions usually similar to the foliage-leaves but smaller. Synangia sessile or very shortly stalked, $\frac{1}{8}$ – $\frac{1}{4}$ in. long, parallel to the petiole, brown, coriaceous. — Benth. *Fl. Austral.* vii. 680; Bak. *Fern Allies*, 30. T. Forsteri, Endl. *Prodr. Fl. Norfolk*. 6; A. Cunn. *Precur.* n. 151; Raoul, *Choix*, 37; Hook. f. *Fl. Nov. Zel.* ii. 51; Handb. N.Z. *Fl.* 391; Thoms. N.Z. *Ferns*, 108. T. truncata, Desv. in Ann. Soc. Linn. Par. vi. 192; Hook. *Gen. Ferns*, t. 86.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Common in forests throughout, usually epiphytic on the stems of tree-ferns, more rarely on rocks. Sea-level to 3000 ft.

For a discussion on the morphology and systematic position of this plant see Professor Bower's memoir "On the Morphology of the Spore-producing Members" (Trans. Roy. Soc. 1894, p. 541–548) and the more recently published paper by Professor Thomas entitled "The Affinity of *Tmesipteris* with the *Sphenophyllales*" (Proc. Roy. Soc., Vol. lxi., p. 343–350).

4. **PSILOTUM**, Swartz.

Rhizome short, creeping, branched; true roots wanting. Stem erect or pendulous, simple below, repeatedly dichotomously branched above; branches angled or flat. Leaves very minute, scale-like, laxly placed, trifarious or distichous. Sporangia (or synangia), coriaceous, almost globular, usually 3-lobed and 3-celled, rarely 2- or 4-celled, in the axil or attached below the fork of a minute bifid scale-like fertile leaf or sporophyll, which is either sessile or raised on a short petiole. Spores minute, oblong, curved.

A small genus of two species, widely distributed in the tropical and sub-tropical regions of both hemispheres. The New Zealand species has the range of the genus.

1. **P. triquetrum**, Swartz, *Syn. Fil.* 117.—Stems 4–18 in. long, erect or pendulous when growing on trees, stout or slender, simple below, many times dichotomously branched in the upper part; branchlets triquetrous, the ultimate ones $\frac{1}{35}$ – $\frac{1}{20}$ in. diam. Leaves placed on the angles of the stems and branches, distant, minute, scale-like, ovate-subulate, $\frac{1}{12}$ – $\frac{1}{8}$ in. long. Fertile leaves bifid, rather smaller than the foliage-leaves, sessile or shortly petiolate. Synangia $\frac{1}{10}$ – $\frac{1}{15}$ in. diam., globose or broader than long.—Hook. *Gen.*

Fil. t. 87; *Fil. Exot.* t. 63; *Hook. f. Fl. Nov. Zel.* ii. 56; *Handb. N.Z. Fl.* 391; *Benth. Fl. Austral.* vii. 681; *Bak. Fern Allies*, 30; *Thoms. N.Z. Ferns*, 108. *P. heterocarpum*, *Col. in Trans. N.Z. Inst.* xx. (1888) 237.

KERMADEC ISLAND: Not uncommon, *T. F. C.* NORTH ISLAND: Rangaunu Harbour, *R. H. Matthews*! Rangitoto Island, *Colenso*! and many others; Auckland Isthmus, very rare, *T. F. C.*; Motuhora Island (Bay of Plenty), *Joliffe*; near Maketu, *Kirk*; soil heated by hot springs at Orakeikorako, *Kirk*! Wairakei, *C. J. Norton*! and Tokaanu, *T. F. C.* Sea-level to 1800 ft.

In all tropical and subtropical regions as far north as Japan and Florida.

ORDER XCVII. ISOETACEÆ.

Aquatic or amphibious perennials, often entirely submerged, rarely terrestrial. Stem (corm) short and tuberous, of firm texture, 2-3-lobed; roots numerous, rather fleshy, dichotomously forked, springing from the furrows of the stem. Leaves many, forming a dense tuft at the top of the stem, linear or filiform, flat in front, rounded at the back, dilated and sheathing at the base, always furnished with 4 longitudinal air-channels divided by transverse partitions, and with a single central vascular bundle; stomata present, or absent in those species which are permanently submerged. Sporangia large, membranous, placed in a hollow (fovea) of the dilated base of the leaf and sometimes partly concealed by the membranous margin (velum or indusium) of the fovea, 1-celled, but often imperfectly divided by rods or plates of tissue (trabeculæ), those of the outer leaves containing macrospores, those of the inner leaves microspores. Immediately above the fovea is a flattened membranous plate called the ligule. Macrospores large, globose, usually chalky-white, with three ribs radiating from the apex. Microspores very minute, trigonous.

A very isolated family, consisting of the single genus *Isoetes*, allied on the one hand to the Lycopods and on the other to ferns. In germination a male prothallium with a single antheridium containing spermatozoids is developed within the microspore, the spermatozoids being set free by the bursting of the coats of the microspores. The macrospores in a similar manner each produce a female prothallium bearing 2 or 3 archegonia, which are ultimately exposed by the splitting of the macrospore along the three ridges. Fertilisation then takes place in the same way as in ferns.

1. ISOETES, Linn.

Characters of the order.

Widely distributed in most temperate and tropical regions. Over 60 species are admitted in the most recent enumeration, but many of them are very imperfectly known. The two found in New Zealand are endemic.

Macrospores tubercled	..	..	..	..	1. <i>I. Kirkii</i> .
Macrospores smooth	..	..	..	..	2. <i>I. alpinus</i> .

1. **I. Kirkii**, *A. Braun in Berl. Monatber.*, July, 1869.—Permanently submerged. Stem short, tuberous, deeply 3-lobed; roots numerous. Leaves 10–30, very slender, 3–12 in. long, about $\frac{1}{20}$ in. diam., tapering to a fine point, pale-green, diaphanous, usually with a few stomata, but with no accessory bast-bundles. Sporangia rather small, broadly oblong or almost globose, about $\frac{1}{8}$ in. long; indusium complete. Macrospores rather small, chalky-white, beset all over with small unequal tubercles. Microspores very minute, trigonous, most minutely punctate.—*Kirk in Trans. N.Z. Inst.* ii. (1870) 107, t. 7; *Bak. Fern Allies*, 127; *Thoms. N.Z. Ferns*, 109.

NORTH ISLAND: Wairua River, *A. Thompson*! lakes in the Middle Waikato Basin, abundant, *Kirk*! *T. F. C.*; Lake Rotokakahi, *Kirk*! Lake Taupo, *C. J. Norton*! SOUTH ISLAND: Small lakes near Lake Tekapo, *T. F. C.* Sea-level to 2500 ft.

Best distinguished from the following species by its smaller size and more slender habit, fewer leaves, and particularly by the conspicuously tubercled macrospores.

2. **I. alpinus**, *T. Kirk in Trans. N.Z. Inst.* vii. (1875) 377, t. 25.—Permanently submerged; much larger and stouter than *I. Kirkii*. Stem stout, deeply 3-lobed. Leaves very numerous, 30–70, 6–18 in. long or even more, $\frac{1}{15}$ – $\frac{1}{10}$ in. broad at the middle, much dilated at the base, gradually tapering to the apex, dark-green, diaphanous, usually with a few stomata, but with no accessory bast-bundles. Sporangia oblong, $\frac{1}{6}$ – $\frac{1}{5}$ in. long; indusium complete. Macrospores greyish-white, smooth or very indistinctly tubercled.—*Bak. Fern Allies*, 127; *Thoms. N.Z. Ferns*, 109. (?) *I. multiangularis*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 449.

NORTH ISLAND: Lake Taupo, *C. J. Norton*. SOUTH ISLAND: Not uncommon in lakes in mountain districts, from Nelson to the south of Otago. 1200–3000 ft.

APPENDIX.

I. SYNOPTICAL KEY TO THE ORDERS.

THE classification adopted in this work is that followed by Hooker and Bentham in their well-known "Genera Plantarum," published between the years 1862 and 1883. It is also the arrangement adopted in the "Flora of New Zealand," the "Handbook," in Bentham's "Flora Australiensis," and in the whole of the series of colonial Floras prepared under the more or less active guidance of the authorities at Kew. Its principal defect is in the sequence of the orders of Dicotyledons, which is made to depend entirely on the characters afforded by the perianth; the polypetalous orders being followed by the gamopetalous, and these in their turn by the various orders in which the floral envelopes are more or less reduced or altogether wanting. But this last group, known as the *Monochlamydeæ*, or *Incompletæ*, consists largely of orders presenting well-marked affinities with others in the Polypetalous or Gamopetalous divisions. Hence by recent authors, and notably by Engler in "Die Natürlichen Pflanzenfamilien," the Monochlamydeous division has been entirely abandoned, the orders composing it being relegated in part to the *Polypetalæ* and in part to the *Gamopetalæ*. As Engler's classification is now largely used, I have appended to the following synopsis a sketch showing how the orders of New Zealand plants are arranged under it.

SUBKINGDOM I. PHANEROGAMIA.

Plants bearing true flowers—that is, having stamens and ovules, the latter after fertilisation developing into seeds containing an embryo.

CLASS I. DICOTYLEDONS.

- Stem consisting of a pith in the centre, of bark on the outside, and of interposed woody tissue; when perennial increasing in diameter annually by the addition of a new layer of wood to the outside of the old wood, and of a new layer of bark to the inside of the old bark. Leaves usually with reticulated veins. Parts of the flower generally in fours or fives or eights. Embryo usually with two opposite cotyledons, rarely with several in a whorl.

SUBCLASS I. ANGIOSPERMOUS DICOTYLEDONS.

Ovules enclosed in an ovary, which is always provided with a stigma. Pollen not directly applied to the ovules, but falling upon the stigma, and there emitting pollen-tubes which pass through the tissue of the stigma and so reach the cavity of the ovary and the ovules.

DIVISION I. POLYPETALÆ.

Flowers with both calyx and corolla. Petals free.

Exceptions.—Flowers wanting the corolla occur in 1, *Ranunculaceæ* (*Clematis*, *Myosurus*, *Caltha*); 3, *Cruciferae* (some species of *Lepidium*); 6, *Caryophylleæ* (*Colobanthus* and a few species of *Stellaria*); 18, *Rhamnææ* (three species of *Pomaderris* and *Discaria Toumatou*); 19, *Sapindaceæ* (both the genera found in New Zealand); 23, *Rosaceæ* (*Acæna*); 27, *Haloragææ* (*Callitriche* and frequently in *Gunnera*); 29, *Onagræææ* (one species of *Fuchsia*); 32, *Ficoideææ* (*Tetragonia*); 35, *Corniceææ* (occasionally in *Griselinia*).

Petals coherent at the base occur in 7, *Portulacææ* (*Montia*, *Hectorella*); 10, *Malvaceææ*; 17, *Stackhousiææ*; 25, *Crassulacææ* (*Tillææ*); 31, *Cucurbitacææ* (*Sicyos*).

Subdivision I. **Thalamifloreæ.** Sepals generally distinct and separate, free from the ovary. Petals hypogynous. Stamens hypogynous, often indefinite. Torus small or elongated, not expanded into a disc. Ovary superior.

Exceptions.—Stamens sometimes slightly perigynous in 6, *Caryophylleææ* (*Colobanthus*).

* *Ovary apocarpous. Carpels 1 or more.*

I. **Ranunculaceæ.** Sepals 3 or more, often petaloid. Petals 5–20, in a single series, wanting in three of the New Zealand genera. Stamens indefinite. Fruit of few or many achenes or follicles. Seeds albuminous.—Herbs with radical or alternate leaves, or climbers with opposite leaves. (p. 1.)

II. **Magnoliaceæ.** Sepals and petals together forming 3 or more series. Stamens indefinite. Fruit of one or more carpels. Seeds albuminous.—Trees with alternate leaves. (p. 28.)

** *Ovary syncarpous. Placentas parietal.*

III. **Cruciferae.** Flowers regular. Sepals 4. Petals 4. Stamens usually 6, 4 of them longer than the others. Ovary spuriously 2-celled. Seeds exalbuminous; embryo large, curved.—Herbs; leaves alternate, exstipulate. (p. 30.)

Exceptions.—Stamens frequently reduced to 4 or even 2 in *Nasturtium* and some species of *Lepidium*.

IV. **Violariææ.** Flowers regular or irregular. Sepals 5. Petals 5. Anthers 5, connivent into a ring surrounding the pistil; connective often produced. Fruit a capsule or berry. Seeds albuminous.—Herbs or shrubs or small trees; leaves alternate. (p. 43.)

V. **Pittosporeæ.** Flowers regular. Sepals and petals 5 each, rarely 4. Stamens 5; anthers free. Fruit a coriaceous or woody 2–4-celled capsule; placentas the same number as the valves. Seeds albuminous; embryo minute.—Trees or shrubs; leaves alternate, exstipulate. (p. 51.)

*** *Ovary syncarpous. Placentas basal.*

VI. **Caryophyllæ.** Sepals 4-5. Petals the same number. Stamens 4-5, or 6-10. Ovary 1-celled; ovules many; styles 2-5. Seeds albuminous; embryo curved.—Herbs; leaves opposite, entire; stipules present or wanting. (p. 61.)

VII. **Portulacæ.** Sepals 2. Petals 4-5. Stamens 3 or more. Ovary 1-celled; ovules 2 or more; style 1, 2-3-fid. Seeds albuminous; embryo curved.—Herbs; leaves opposite or alternate, entire; stipules present or wanting. (p. 70.)

**** *Ovary syncarpous. Placentas axile.*

VIII. **Elatineæ.** Sepals 2-5. Petals the same number. Stamens equal in number to the petals or twice as many. Ovary 2-5-celled; ovules many; styles 2-5.—Aquatic herbs; leaves opposite, stipulate. (p. 73.)

IX. **Hypericineæ.** Sepals 5. Petals 5. Stamens numerous, free or polyadelphous. Ovary 3-5-celled; ovules numerous; styles 3-5.—Herbs or shrubs; leaves opposite, exstipulate, usually gland-dotted. (p. 74.)

X. **Malvaceæ.** Sepals 5, persistent. Petals 5, contorted in bud. Stamens monadelphous; anthers 1-celled. Carpels either several connate into a ring or forming a 5-10-celled capsule, rarely reduced to 1.—Herbs or shrubs or small trees, often with stellate down; leaves alternate, stipulate. (p. 75.)

XI. **Tiliaceæ.** Sepals 5, deciduous. Petals 5. Stamens free, or connate at the base only; anthers 2-celled. Ovary 2-10-celled.—Trees or shrubs; leaves alternate or opposite, stipulate. (p. 81.)

Subdivision II. **Discifloræ.**—Sepals distinct or connate, free or rarely adnate to the ovary. Disc usually conspicuous, expanded into a ring or cushion either free or adnate to the ovary or calyx or to both, rarely broken up into separate glands. Stamens usually definite, inserted upon the disc or at its outer or inner base. Ovary superior.

Exceptions.—Disc reduced to minute glands in 12, *Lineæ*; and 13, *Geraniaceæ*; altogether wanting in 21, *Coriariææ*.

XII. **Lineæ.** Flowers regular. Sepals 4-5. Petals 4-5, convolute in bud. Stamens usually 4-5. Ovary 3-5-celled; ovules 1-2 in each cell; styles 3-5. Seeds albuminous.—Herbs; leaves alternate, entire, usually exstipulate. (p. 86.)

XIII. **Geraniaceæ.** Flowers regular or irregular. Sepals 3-5. Petals 3-5, imbricate in bud. Stamens usually 10. Ovary 3-5-lobed and -celled; ovules 1 or 2 or rarely many in each cell.—Herbs; leaves opposite or alternate, stipulate or exstipulate. (p. 87.)

XIV. **Rutaceæ.** Sepals and petals 4-5, imbricate in bud. Stamens 8-10, inserted at the outer base of a fleshy disc. Ovary 3-5-lobed, or of 3-5 separate carpels; style often simple; ovules 2 in each cell.—Trees or shrubs, rarely herbs; leaves usually opposite, often compound, gland-dotted, exstipulate. (p. 92.)

XV. **Meliaceæ.** Calyx small, 4-5-lobed. Petals 4-5. Stamens monadelphous; anthers sessile or stipitate at the top of the staminal tube. Disc annular or tubular. Ovary entire, 3-5-celled; ovules 2 in each cell.—Shrubs or trees; leaves alternate, usually compound, exstipulate. (p. 95.)

XVI. **Olacinaceæ.** Calyx small, 4-5-lobed. Petals 4-5, free or connate at the base. Stamens 4-10. Ovary 1-celled or imperfectly 3-celled; ovules 1-3, pendulous; style 1.—Shrubs or trees; leaves alternate, exstipulate. (p. 96.)

XVII. **Stackhouseiæ.** Calyx 5-lobed. Petals 5, linear, free or connate above the base. Stamens 5. Ovary 2-5-lobed and -celled; styles 2-5; ovules solitary in each cell. Fruit of 2-5 cocci.—Herbs; leaves alternate, simple and entire. (p. 97.)

XVIII. **Rhamneæ.** Calyx 2-5-lobed, valvate. Petals 4-5, often minute or wanting. Stamens as many as the petals and opposite to them, inserted on the margin of the disc. Ovary often inferior, 3-celled; style simple; ovules 1 in each cell.—Shrubs or trees, often with stellate hairs; leaves alternate or opposite, stipulate. (p. 98.)

XIX. **Sapindaceæ.** Calyx 4-5-lobed or of 4-5 distinct sepals. Petals wanting in the New Zealand genera. Stamens 5-8, hypogynous or inserted within the disc. Ovary 1- or 2-3-celled; style simple; ovules usually 1-2 in each cell.—Trees; leaves alternate, simple or compound, exstipulate or rarely stipulate. (p. 101.)

XX. **Anacardiaceæ.** Calyx 3-5-lobed. Petals 3-7. Stamens as many or twice as many as the petals, inserted under or upon the disc. Ovary usually 1-celled; ovule solitary.—Trees or shrubs; leaves alternate, exstipulate. (p. 104.)

XXI. **Coriariæ.** Sepals 5. Petals 5, free, becoming fleshy in fruit. Stamens 10, hypogynous. Disc wanting. Ovary of 5-10 free carpels; ovules solitary in each carpel; styles as many as the carpels. Fruit of 5-10 indehiscent cocci, embraced by the fleshy and juicy petals.—Shrubs, sometimes herbaceous; leaves opposite or in threes, simple, entire, exstipulate. (p. 105.)

Subdivision III. **Calycifloræ.** Sepals usually more or less connate, very rarely distinct, often adnate to the ovary. Petals and stamens inserted on the inside of the calyx-tube, or on the top of an epigynous disc when the calyx is adnate to the ovary. Ovary superior or inferior.

Exceptions.—Calyx and corolla both wanting in one genus of 27, *Haloragææ* (*Callitriche*). Petals connate at the base in 25, *Crassulaceæ* (*Tillæa*). Stamens hypogynous in 26, *Droseraceæ*.

* *Ovary superior* (except in some *Rosaceæ* and *Saxifrageæ*).
Stamens perigynous.

XXII. Leguminosæ. Flowers irregular and papilionaceous in the New Zealand genera. Stamens 10 in the New Zealand genera, all or 9 of them combined into a tube sheathing the pistil. Ovary of a single carpel. Fruit a legume. Seeds without albumen.—Trees, shrubs, or herbs; leaves often compound, usually alternate and stipulate. (p. 107.)

Exceptions.—*Carmichaelia*, *Coralliospartium*, and *Notospartium* are usually leafless, and the structure of the pod in the first is most remarkable.

XXIII. Rosaceæ. Flowers regular. Calyx 4–5-lobed; tube inferior or enclosing the ovary, or (in some non-indigenous genera) adnate to the ovary. Petals 4–5. Ovary of 1 or more free or connate carpels; ovules 1 or more in each carpel. Seeds without albumen.—Herbs or shrubs; leaves usually alternate, stipulate. (p. 123.)

XXIV. Saxifrageæ. Calyx inferior or superior, 4–5-lobed. Petals 4–5. Stamens 5–10. Ovary 2–5-celled; ovules usually numerous in each cell. Seeds albuminous.—Herbs, shrubs, or trees; leaves opposite or alternate, simple or compound. (p. 133.)

Exception.—*Donatia* is a very anomalous member of the order.

XXV. Crassulaceæ. Flowers regular. Calyx 3–5-partite. Petals 3–5, subhypogynous. Stamens the same number as the petals or twice as many, subhypogynous. Carpels as many as the petals, free, 1-celled.—Succulent herbs, with entire opposite leaves and no stipules. (p. 139.)

XXVI. Droseraceæ. Flowers regular. Sepals and petals 4–5, imbricate in bud. Stamens the same number, hypogynous or perigynous. Ovary usually 1-celled; ovules many, on parietal placentas. Fruit capsular; seeds albuminous.—Herbs; leaves radical or alternate, covered with glandular irritable hairs. (p. 144.)

** *Ovary inferior* (except in *Passifloreæ*). *Stamens epigynous*.

XXVII. Haloragææ. Flowers often much reduced. Calyx-limb 2–4-toothed or wanting. Petals 2–4 or wanting. Stamens 1, 2, or 4, epigynous. Ovary 1–4-celled; ovules solitary in each cell. Seeds albuminous.—Herbs, terrestrial or aquatic; leaves various. (p. 147.)

Exceptions.—Calyx and corolla both wanting in *Callitriche*. Petals often wanting in *Gunnera* and *Myriophyllum*.

XXVIII. Myrtaceæ. Calyx-lobes 4-5. Petals 4-5, imbricate. Stamens numerous. Ovary inferior or half-superior, 2-5-celled; ovules few or many.—Trees or shrubs; leaves opposite or alternate, exstipulate, usually gland-dotted. (p. 159.)

XXIX. Onagrarieæ. Calyx-lobes 2-4, valvate. Petals 2-4, contorted in bud. Stamens 4 or 8. Ovary inferior, 2-4-celled; ovules numerous in each cell. Seeds without albumen.—Herbs, shrubs, or trees; leaves opposite or alternate, exstipulate. (p. 170.)

XXX. Passifloreæ. Calyx-lobes 4-5. Petals 3-5, often with a crown of filaments at their base. Stamens as many as the petals. Ovary superior, stipitate, 1-celled; ovules numerous, on parietal placentas. Seeds albuminous.—Climbers with lateral tendrils; leaves alternate, stipulate. (p. 187.)

XXXI. Cucurbitaceæ. Flowers unisexual. Calyx-lobes 5. Corolla 5-partite or of 5 free petals. Stamens 3-5. Ovary inferior, 1-celled and 1-ovuled in the sole New Zealand genus. Seeds without albumen.—Climbers or trailers, with lateral tendrils; leaves alternate, exstipulate. (p. 189.)

XXXII. Ficoideæ. Calyx-lobes 3-5. Petals numerous or wanting. Stamens few or many. Ovary inferior in the New Zealand genera, 3-8-celled; ovules 1 or many in each cell. Seeds albuminous.—Succulent herbs; leaves opposite or alternate. (p. 190.)

XXXIII. Umbelliferæ. Calyx-lobes 5 or obsolete. Petals 5. Stamens 5, incurved in bud. Ovary inferior, 2-celled; styles 2; ovules solitary in each cell. Fruit separating into 2 dry indehiscent carpels.—Herbs, often aromatic; leaves alternate, simple or compound. (p. 193.)

XXXIV. Araliaceæ. Calyx-lobes 5 or obsolete. Petals usually 5. Stamens 5. Ovary inferior, 2-10-celled; styles as many as the cells; ovules solitary in each cell. Fruit not separable into distinct carpels, often succulent.—Shrubs or trees; leaves simple or 1-7-foliate. (p. 225.)

XXXV. Cornaceæ. Calyx-lobes 4-5. Petals 4-5 or wanting. Stamens 4-5. Ovary inferior, 1-2-celled; ovules solitary in each cell. Fruit succulent, indehiscent.—Shrubs or trees; leaves simple, alternate in the New Zealand species. (p. 236.)

DIVISION II. GAMOPETALÆ.

Flowers with both calyx and corolla. Petals more or less connate into a lobed corolla.

Exceptions.—Corolla absent in the New Zealand species of 47, *Oleaceæ*. Petals free or nearly so in some species of 45, *Myrsineæ*.

Subdivision I. **Epigynæ.** Ovary inferior.* *Stamens epipetalous.*

XXXVI. **Caprifoliaceæ.** Flowers regular in the New Zealand species. Calyx-lobes 4-5. Corolla-lobes 4-5. Anthers free. Ovary 2-5-celled; ovules 1 or several in each cell. Seeds albuminous.—Shrubs; leaves opposite or alternate, stipules wanting. (p. 239.)

XXXVII. **Rubiaceæ.** Flowers regular. Calyx-lobes 4-5 or obsolete. Corolla-lobes usually 4-5. Anthers free. Ovary 2-celled; ovules solitary in each cell in the New Zealand species. Seeds albuminous.—Trees, shrubs, or herbs; leaves opposite with interpetiolar stipules, or whorled with the stipules apparently absent. (p. 242.)

XXXVIII. **Compositæ.** Flowers small, massed in involucrate heads. Calyx-limb reduced to pappus-hairs or scales or wanting. Anthers connate into a tube sheathing the style. Ovary 1-celled; ovule solitary, erect. Seed dry, exalbuminous.—Herbs, shrubs, or trees; leaves various, exstipulate. (p. 267.)

** *Stamens epigynous.*

XXXIX. **Stylidiæ.** Flowers regular or irregular. Corolla 5-lobed; lobes imbricate. Stamens 2; filaments adnate with the style into a central column. Ovary 2-celled; ovules numerous in each cell.—Herbs, usually of small size; leaves small, entire, exstipulate. (p. 389.)

XL. **Goodenoviæ.** Flowers irregular. Corolla 5-lobed; lobes induplicate-valvate. Stamens 5, free from the style. Ovary 1-2-celled; ovules 1-2 in each cell or numerous; style with a cup-shaped indusium below the stigma.—Herbs or undershrubs; leaves usually alternate, exstipulate. (p. 394.)

XLI. **Campanulaceæ.** Flowers regular or irregular. Stamens 5, free or connate into a tube surrounding the style. Ovary 2-8-celled; ovules numerous in each cell.—Herbs; leaves alternate, exstipulate. (p. 396.)

Subdivision II. **Hypogynæ.** Ovary superior. Stamens epipetalous, or free and hypogynous.

* *Flowers usually regular.*

XLII. **Ericaceæ.** Corolla 4-5-lobed. Stamens 8-10, almost free from the corolla; anthers 2-celled, opening by 2 terminal pores.—Shrubs; leaves alternate, exstipulate. (p. 404.)

XLIII. **Epacrideæ.** Corolla 4-5-lobed. Stamens 4-5, alternate with the corolla-lobes; anthers 1-celled, dehiscing lengthwise.—Shrubs or small trees; leaves alternate, exstipulate. (p. 409.)

XLIV. Primulaceæ. Corolla 4-5-lobed. Stamens as many as the corolla-lobes and opposite to them. Ovary 1-celled; ovules numerous on a free central placenta. Fruit capsular, usually indehiscent.—Herbs; leaves various. (p. 428.)

XLV. Myrsinæ. Corolla-lobes 4-5, free or nearly so in the New Zealand species. Stamens as many as the corolla-lobes and opposite to them. Ovary 1-celled; ovules numerous on a free central placenta. Fruit succulent, indehiscent.—Trees or shrubs; leaves alternate, gland-dotted, exstipulate. (p. 430.)

XLVI. Sapotaceæ. Corolla 4-8-lobed. Stamens as many as the corolla-lobes and opposite to them or twice as many. Ovary 4-8-celled; ovules solitary in each cell. Fruit an indehiscent berry.—Trees, often with milky juice; leaves alternate. (p. 434.)

XLVII. Oleaceæ. Corolla 4-5-lobed, absent in the New Zealand species. Stamens 2, alternating with the carpels. Ovary 2-celled; ovules 1-2 in each cell. Fruit succulent in the New Zealand species, indehiscent.—Trees or shrubs; leaves usually opposite, exstipulate. (p. 436.)

XLVIII. Apocynaceæ. Corolla 4-5-lobed, contorted in the bud. Stamens 4-5, alternate with the corolla-lobes; anthers sagittate, connivent around the stigma. Ovary of 2 more or less distinct carpels; styles connected; ovules numerous.—Erect or twining shrubs, more rarely herbs; leaves usually opposite. (p. 439.)

XLIX. Loganiaceæ. Corolla 4-5-lobed. Stamens as many as the corolla-lobes and alternate with them; anthers free. Ovary usually 2-celled; placentas axile; ovules several in each cell.—Shrubs or trees; leaves opposite, often connected by interpetiolar stipules. (p. 441.)

L. Gentianeæ. Corolla 4-5-lobed. Stamens as many as the corolla-lobes and alternate with them; anthers free. Ovary 1-celled; placentas 2, parietal. Ovules numerous. Fruit capsular.—Herbs, usually with a bitter taste; leaves opposite, quite entire, exstipulate. (p. 444.)

LI. Boraginaceæ. Corolla 5-lobed, imbricate. Stamens as many as the corolla-lobes and alternate with them. Ovary 4-lobed to the base, consisting of 2 2-lobed and 2-celled carpels; ovules solitary in each cell. Fruit separating into 4 indehiscent nutlets.—Herbs, often hispid or scabrid; leaves alternate, exstipulate. (p. 457.)

LII. Convolvulaceæ. Corolla 5-lobed or -angled, plicate. Stamens 5, alternate with the corolla-lobes. Ovary of 2-4-cells or carpels; ovules 1-2 in each cell. Fruit usually capsular.—Twining or rarely erect herbs; leaves alternate (wanting in *Cuscuta*), exstipulate. (p. 473.)

LIII. Solanaceæ. Corolla 5-lobed, plaited or imbricate. Stamens 5, alternate with the corolla-lobes. Ovary 2-celled; placentas axile; ovules numerous in each cell. Fruit baccate or capsular.—Herbs or shrubs; leaves alternate, exstipulate. (p. 480.)

*** Flowers usually irregular.*

Exceptions.—Flowers regular in 60, *Plantagineæ*; subregular in several species of *Veronica* (54, *Scrophularineæ*), and in *Myoporum* (57, *Myoporineæ*).

LIV. Scrophularineæ. Corolla 4–5-lobed; lobes imbricate. Stamens usually 4, didynamous, often with the rudiment of a fifth, rarely with 5 perfect ones, or the number reduced to 2. Ovary 2-celled; placentas axile; ovules numerous. Fruit usually capsular; seeds albuminous.—Shrubs or herbs; leaves opposite or alternate, exstipulate. (p. 482.)

LV. Lentibulariæ. Corolla 2-lipped. Stamens 2. Ovary 1-celled; ovules numerous on a free central placenta. Fruit capsular; seeds without albumen.—Small water-plants, usually furnished with minute bladders which catch small aquatic animals. (p. 558.)

LVI. Gesneraceæ. Corolla 5-lobed. Stamens 4, didynamous, sometimes reduced to 2. Ovary 1-celled; ovules numerous on 2 parietal placentas. Fruit capsular; seeds with or without albumen.—Shrubs or trees; leaves opposite. (p. 562.)

LVII. Myoporineæ. Corolla subregular in the New Zealand species. Stamens 4, didynamous or subequal. Ovary usually 2–4-celled, with 2 ovules in each cell. Fruit drupaceous; seeds albuminous, radicle superior.—Shrubs or trees; leaves alternate, gland-dotted. (p. 563.)

LVIII. Verbenaceæ. Corolla often 2-lipped. Stamens 4, didynamous, rarely reduced to 2. Ovary 2–4-celled; ovules 1–2 in each cell. Fruit drupaceous or capsular; seeds with scanty albumen, radicle inferior.—Shrubs or trees; leaves opposite, exstipulate. (p. 564.)

LIX. Labiatæ. Corolla 2-lipped or rarely subregular. Stamens 4, didynamous or subequal, rarely 2. Ovary 4-lobed, composed of 2 2-partite carpels; ovule solitary in each lobe. Fruit of 4 indehiscent nutlets.—Herbs, with quadrangular stems; leaves opposite or verticillate, exstipulate. (p. 567.)

LX. Plantagineæ. Flowers regular. Corolla 4-lobed, scarious. Stamens 4; anthers pendulous. Ovary 2-celled or spuriously 4-celled; ovules 1 or several. Fruit a capsule with transverse dehiscence.—Herbs, with radical leaves. (p. 569.)

DIVISION III. INCOMPLETÆ.

Flowers with a single floral envelope (the calyx), or both calyx and corolla wanting.

* *Flowers usually hermaphrodite. Perianth regular. Ovary superior, syncarpous, 1-celled; ovule generally solitary. Embryo coiled or curved; albumen farinaceous.*

LXI. Nyctagineæ. Base of the perianth persistent, enclosing the fruit. Stamens hypogynous. Style single, undivided. Ovule basilar, erect.—Shrubs, trees, or herbs; leaves usually opposite, exstipulate. (p. 573.)

LXII. Illecebraceæ. Perianth 4-5-partite, herbaceous or coriaceous. Stamens perigynous. Styles 2-3. Fruit an indehiscent 1-seeded utricle.—Herbs; leaves opposite, connected by a raised line, exstipulate in the single New Zealand genus. (p. 575.)

LXIII. Amarantaceæ. Perianth 4-5-partite, dry and scarious. Stamens hypogynous or perigynous. Style usually simple. Fruit an indehiscent 1-seeded utricle.—Herbs; leaves alternate or opposite, exstipulate. (p. 576.)

LXIV. Chenopodiaceæ. Perianth usually 4-5-partite, herbaceous. Stamens perigynous. Styles 2-3. Ovule basilar, amphitropous, horizontal or erect.—Herbs or undershrubs, often succulent or mealy-tomentose; leaves alternate or opposite, exstipulate. (p. 577.)

LXV. Polygonaceæ. Perianth 3-5-partite, green or coloured. Stamens perigynous. Styles 2-3. Ovule erect, basilar, orthotropous.—Herbs or shrubs; leaves alternate; stipules scarious, forming a tubular sheath round the branch. (p. 587.)

** *Flowers generally unisexual, in spikes or catkins. Perianth rudimentary or wanting. Ovary superior or rarely inferior, 1-celled and 1-ovuled. Embryo very small; albumen copious.*

LXVI. Piperaceæ. Flowers minute; perianth wanting. Stamens 2-6, hypogynous. Ovary superior; ovule erect, orthotropous. Fruit a berry.—Herbs, shrubs, or trees; leaves alternate or opposite. (p. 594.)

LXVII. Chloranthaceæ. Flowers minute; perianth rudimentary. Stamens 1-3. Ovary inferior; ovule orthotropous, pendulous from the apex of the cell.—Shrubs or small trees; leaves opposite. (p. 597.)

*** *Flowers hermaphrodite or unisexual. Perianth more or less conspicuous, green or coloured. Ovary superior, 1- or rarely 2-celled; ovules solitary or 2-4. Seeds with or without albumen; embryo straight.*

LXVIII. **Monimiaceæ.** Perianth 4-10-lobed, imbricate. Stamens indefinite. Ovary of numerous 1-celled and 1-ovuled carpels. Embryo small; albumen fleshy.—Trees or shrubs; leaves opposite, exstipulate. (p. 598.)

LXIX. **Laurineæ.** Perianth 4-8-partite, imbricate. Stamens opposite the perianth-segments; anthers opening by deciduous valves. Ovary 1-celled; ovule solitary, pendulous. Albumen wanting.—Trees or shrubs or alternate leaves, or leafless twiners. (p. 601.)

LXX. **Proteaceæ.** Perianth 4-partite, valvate. Stamens 4, opposite the perianth-segments and inserted on them. Ovary 1-celled; ovules solitary or 2 collateral, rarely more. Albumen wanting.—Trees or shrubs; leaves usually alternate. (p. 604.)

LXXI. **Thymelæaceæ.** Perianth tubular, 4-5-lobed. Stamens 2-4, inserted on the perianth-tube. Ovary 1-2-celled; ovules solitary in each cell, pendulous.—Shrubs or rarely herbs; bark tough and stringy; leaves opposite or alternate. (p. 607.)

**** *Flowers hermaphrodite or unisexual. Perianth usually conspicuous. Ovary inferior, 1-celled; ovules 1-3, generally devoid of integument.*

LXXII. **Loranthaceæ.** Perianth 4-5-partite or of 4-5 separate leaves. Stamens as many as the perianth-leaves. Ovule solitary. Fruit a berry.—Parasitic shrubs; leaves sometimes wanting. (p. 617.)

LXXIII. **Santalaceæ.** Perianth 3-5-partite. Stamens as many as the perianth-segments and inserted upon them. Ovules 1-4, suspended from a free central placenta. Fruit a berry.—Shrubs or trees, rarely herbs, sometimes parasitic; leaves opposite or alternate, exstipulate. (p. 623.)

LXXIV. **Balanophoreæ.** Flowers diœcious or monœcious, on many-flowered spadices. Perianth of the male flowers 3-4-lobed when present, absent in the female flowers or closely adnate to the ovary. Ovary with a single suspended ovule.—Root-parasites with a deformed tuberous rhizome, and no true stem or leaves. (p. 625.)

***** *Flowers strictly unisexual. Perianth absent or small or calycine. Ovary superior or inferior, 1-3-celled; ovules 1, or 2 collateral in each cell.*

LXXV. **Euphorbiaceæ.** Perianth wanting, or simple and calycine, or double with the inner whorl of 4-5 petals. Stamens 1 to

many. Ovary superior, 3-celled; ovules 1-2 in each cell. Seeds with copious albumen; embryo straight.—Trees, shrubs, or herbs, usually with milky acrid juice; leaves generally alternate, stipulate. (p. 626.)

LXXVI. Urticaceæ. Flowers minute, green. Perianth 4-5-lobed or -partite, often small and rudimentary, sometimes wanting. Stamens 4-5, opposite the perianth-segments. Ovary superior, 1-celled; ovule solitary, erect or pendulous.—Trees, shrubs, or herbs; leaves usually alternate, stipulate. (p. 630.)

LXXVII. Cupuliferæ. Flowers minute, greenish; males in catkins; females solitary or few together, surrounded by bracts. Perianth small or wanting. Ovary inferior, 2-3-celled; ovules 2 in each cell. Fruit indehiscent, 1-seeded.—Trees or shrubs; leaves alternate, stipulate. (p. 639.)

SUBCLASS II. GYMNOSPERMÆ.

Ovules naked, not enclosed in an ovary; style and stigma wanting. Pollen coming into direct contact with the ovules.

LXXVIII. Coniferæ. Flowers unisexual. Perianth always wanting. Males catkin-like, reduced to stamens only. Females of one or more naked ovules sessile on a scale or bract; scales few or many, in the latter case often forming cones or heads.—Trees or shrubs; leaves undivided, acicular or scale-like, rarely flattened. (p. 644.)

CLASS II. MONOCOTYLEDONS.

Stem consisting of a cellular axis traversed longitudinally by scattered closed vascular bundles, with no defined central pith or separable bark. Leaves usually with parallel veins. Parts of the flower generally in threes or fours, never in fives. Embryo with a single terminal cotyledon.

Series I. **Epigynæ.** Perianth conspicuous, biseriate, usually coloured. Ovary inferior, syncarpous, 3-celled.

LXXIX. Orchideæ. Flowers irregular. Perianth petaloid. Stamen 1 (or rarely 2) confluent with the style and stigma into a column. Ovary 1-celled, with 3 parietal placentas. Seeds numerous, minute, without albumen.—Terrestrial or epiphytic herbs, of very various habit. (p. 660.)

LXXX. Irideæ. Flowers regular in the New Zealand species. Perianth petaloid. Stamens 3, distinct; anthers extrorse. Ovary 3-celled. Fruit a loculicidally 3-valved capsule. Seeds with copious albumen.—Perennial herbs; leaves narrow, often equitant and ensiform. (p. 698.)

LXXXI. Amaryllideæ. Flowers regular. Perianth petaloid. Stamens 6, distinct; anthers extrorse. Ovary 3-celled. Fruit a loculicidally 3-valved capsule. Seeds with copious albumen.—Perennial herbs; leaves narrow, usually radical. (p. 700.)

Series II. **Coronarieæ.** Perianth more or less conspicuous, biseriate, green or coloured. Ovary superior, syncarpous. Seeds albuminous.

LXXXII. Liliaceæ. Perianth petaloid, of 6 segments or leaflets. Stamens 6, opposite the perianth-segments. Ovary 3-celled; ovules 2 or more in each cell.—Herbs, climbing shrubs, or trees; leaves various. (p. 701.)

LXXXIII. Juncaceæ. Perianth green or brown, scarious, of 6 segments or leaflets. Stamens 3 or 6. Ovary 1- or 3-celled; ovules 1 or many in each cell. Fruit a 3-valved capsule.—Herbs, with persistent rush-like leaves. (p. 721.)

LXXXIV. Palmæ.—Perianth green, herbaceous or fleshy, of 6 segments or leaflets. Stamens usually 6. Ovary 1-3-celled; ovules solitary in each cell. Fruit drupaceous.—Trees; leaves large, pinnately or flabellately divided. (p. 739.)

Series III. **Nudifloræ.** Perianth wanting or rudimentary. Ovary superior, syncarpous or monocarpous or apocarpous.

LXXXV. Pandaneæ. Flowers diœcious, on oblong or globose spadices. Perianth wanting. Stamens numerous. Ovaries crowded, often connate, 1-celled; ovules numerous in the New Zealand genus.—Trees or climbing shrubs; leaves narrow, margins spinulose-serrate. (p. 740.)

LXXXVI. Typhaceæ. Flowers monœcious, in dense spikes or globose heads. Perianth wanting or reduced to scales or bristles. Stamens 1-8. Ovary 1-2-celled; ovules solitary.—Tall aquatic herbs, with linear leaves. (p. 742.)

LXXXVII. Lemnaceæ. Flowers minute, without perianth, placed in clefts on the margins of the fronds, usually a single female with one or two males by its side. Male flowers of a single stamen; female of a solitary carpel.—Minute water-plants, consisting of green scale-like floating fronds. (p. 744.)

LXXXVIII. Naiadaceæ. Flowers hermaphrodite or unisexual. Perianth wanting or of 3-6 herbaceous segments. Stamens 1-6. Ovary of 1-6 free or connate carpels, each 1-celled and with a solitary ovule.—Submerged or floating aquatic plants, or marsh herbs. (p. 745.)

Series IV. **Glumifloræ**. Flowers in heads or spikelets, invested by imbricate bracts. Perianth wanting or reduced to minute bristles or scales. Ovary superior, 1-celled and 1-ovuled, or divided into several 1-ovuled cells or distinct carpels.

LXXXIX. **Centrolepidæ**. Flowers hermaphrodite or polygamous. Perianth wanting. Stamens 1 or 2; anthers versatile. Ovary either 1-celled or collaterally 2-3-celled, or of several distinct 1-celled carpels.—Small annual or perennial herbs, sometimes almost moss-like; leaves linear or filiform. (p. 755.)

XC. **Restiaceæ**. Flowers unisexual. Perianth of 6 scarious leaflets. Stamens 3. Ovary 1-3-celled; ovules solitary in each cell, pendulous. Fruit nucular or capsular.—Stems solid, terete; leaf-sheaths split to the base. (p. 759.)

XCI. **Cyperaceæ**. Flowers hermaphrodite or unisexual. Perianth wanting or represented by minute hypogynous scales or bristles. Anthers basifixed. Ovary 1-celled. Fruit compressed or trigonous.—Stems usually solid and trigonous; leaf-sheaths entire. (p. 762.)

XCII. **Gramineæ**. Flowers hermaphrodite or rarely unisexual. Perianth wanting or represented by 2 minute scales. Anthers versatile. Ovary 1-celled. Fruit grooved down one side.—Stem cylindrical, hollow except at the nodes; leaf-sheaths split to the base. (p. 838.)

SUBKINGDOM II. CRYPTOGAMIA.

Plants not bearing true flowers—that is, having no stamens nor ovules, and never producing seeds containing an embryo.

CLASS I. PTERIDOPHYTA.

Plants usually furnished with roots, leaves, and stems; in all cases containing well-developed vascular tissue. Reproductive organs composed of sporangia or spore-cases, containing microscopic spores, which on germination develop a prothallium.

XCIII. **Filices**. Sporangia minute, placed on the margin or under-surface of the leaf or frond, rarely somewhat larger and arranged in spikes or panicles. Spores all of one kind.—Fronds circinate in veneration (except in the suborder *Ophioglossaceæ*). (p. 925.)

XCIV. **Marsileaceæ**. Sporangia of 2 kinds, macrosporangia and microsporangia, enclosed together in the cavities or cells of globose sporocarps near the base of the fronds. Macrosporangia containing a single macrospore; microsporangia with numerous microspores.—Marsh plants, usually of small size; fronds circinate in veneration. (p. 1030.)

XCV. **Salviniaceæ.** Sporangia of 2 kinds, macrosporangia and microsporangia, enclosed in distinct sporocarps on the under-surface of the frond. Macrosporangia containing a single macrospore; microsporangia with numerous microspores.—Free-floating fugacious annual water-plants, of small size. (p. 1030.)

XCVI. **Lycopodiaceæ.** Sporangia all of one kind, placed singly at the upper base of the leaves or of the bracts of a spike or cone.—Stems simple or branched, erect or pendulous, or prostrate and creeping, usually leafy throughout; leaves small. (p. 1032.)

XCVII. **Isoetaceæ.** Sporangia large, placed in a hollow of the dilated base of the leaf, those of the outer leaves containing macrospores, those of the inner leaves microspores.—Aquatic or amphibious stemless plants, often entirely submerged; leaves densely tufted, linear or filiform. (p. 1042.)

The remaining classes and orders of *Cryptogamia* are not included in the present work.

ARRANGEMENT OF THE NEW ZEALAND ORDERS ACCORDING TO THE CLASSIFICATION ADOPTED IN ENGLER AND PRANTL'S "NATURLICHEN PFLANZENFAMILIEN."

SUBKINGDOM **EMBRYOPHYTA SIPHONOGAMA.**

DIVISION I. GYMNOSPERMÆ.

CLASS I. **CONIFERÆ.**

1. Taxaceæ. 2. Pinaceæ (equivalent to Order 78 of the previous arrangement).

DIVISION II. ANGIOSPERMÆ.

CLASS I. **MONOCOTYLEDONEÆ.**

Cohort I. **Pandanales.**

3. Typhaceæ (part 86). 4. Pandanaceæ (85). 5. Sparganiaceæ (part 86).

Cohort II. **Helobiæ.**

6. Potamogetonaceæ (part 88). 7. Juncaginaceæ (part 88).

Cohort III. **Glumifloræ.**

8. Gramineæ (92). 9. Cyperaceæ (91).

Cohort IV. **Principes.**

10. Palmæ (84).

Cohort V. **Spathifloræ.**

11. Lemnaceæ (87).

Cohort VI. **Farinosæ.**

12. Restionaceæ (90). 13. Centrolepidaceæ (89).

Cohort VII. **Liliifloræ.**

14. Juncaceæ (83). 15. Liliaceæ (82). 16. Amaryllidaceæ (81).
17. Iridaceæ (80).

Cohort VIII. **Microspermæ.**

18. Orchidaceæ (79).

CLASS II. **DICOTYLEDONEÆ.**SUBCLASS I. **ARCHICHLAMYDEÆ.**Cohort I. **Piperales.**

19. Piperaceæ (66). 20. Chloranthaceæ (67).

Cohort II. **Fagales.**

21. Fagaceæ (77).

Cohort III. **Urticales.**

22. Moraceæ (part 76). 23. Urticaceæ (part 76).

Cohort IV. **Proteales.**

24. Proteaceæ (70).

Cohort V. **Santalales.**

25. Loranthaceæ (72). 26. Santalaceæ (73). 27. Balanophor-
ceæ (74).

Cohort VI. **Polygonales.**

28. Polygonaceæ (65).

Cohort VII. **Centrospermæ.**

29. Chenopodiaceæ (64). 30. Amarantaceæ (63). 31. Nycta-
ginaceæ (61). 32. Aizoaceæ (32). 33. Portulacæ (7). 34. Caryo-
phyllaceæ (6 and 62).

Cohort VIII. Ranales.

35. Ranunculaceæ (1). 36. Magnoliaceæ (2). 37. Monimiaceæ (68). 38. Lauraceæ (69).

Cohort IX. Rhoadales.

39. Cruciferæ (3).

Cohort X. Sarraceniales.

40. Droseraceæ (26).

Cohort XI. Rosales.

41. Crassulaceæ (25). 42. Saxifragaceæ (part 24). 43. Pittosporaceæ (5). 44. Cunoniaceæ (part 24). 45. Rosaceæ (23). 46. Leguminosæ (22).

Cohort XII. Geraniales.

47. Geraniaceæ (13). 48. Oxalidaceæ (part 13). 49. Linaceæ (12). 50. Rutaceæ (14). 51. Meliaceæ (15). 52. Euphorbiaceæ (75). 53. Callitrichaceæ (part 27).

Cohort XIII. Celastrales.

54. Coriariaceæ (21). 55. Corynocarpaceæ (20). 56. Stackhousiaceæ (17). 57. Icacinaceæ (16). 58. Sapindaceæ (19).

Cohort XIV. Rhamnales.

59. Rhamnaceæ (18).

Cohort XV. Malvales.

60. Elæocarpaceæ (part 11). 61. Tiliaceæ (part 11). 62. Malvaceæ (10).

Cohort XVI. Parietales.

63. Guttiferæ (9). 64. Elatinaceæ (8). 65. Violaceæ (4). 66. Passifloraceæ (30).

Cohort XVII. Myrtifloræ.

67. Thymelæaceæ (71). 68. Myrtaceæ (28). 69. Onagraceæ (29). 70. Halorrhagidaceæ (part 27).

Cohort XVIII. Umbellifloræ.

71. Araliaceæ (34). 72. Umbelliferæ (33). 73. Cornaceæ (35).

SUBCLASS II. SYMPETALÆ.

Cohort XIX. **Ericales.**

74. Ericaceæ (42). 75. Epacridaceæ (43).

Cohort XX. **Primulales.**

76. Myrsinaceæ (45). 77. Primulaceæ (44).

Cohort XXI. **Ebenales.**

78. Sapotaceæ (46).

Cohort XXII. **Contortæ.**

79. Oleaceæ (47). 80. Loganiaceæ (49). 81. Gentianaceæ (50).
82. Apocynaceæ (48).

Cohort XXIII. **Tubifloræ.**

83. Convolvulaceæ (52). 84. Borraginaceæ (51). 85. Verbenaceæ (58). 86. Labiataæ (59). 87. Solanaceæ (53). 88. Scrophulariaceæ (54). 89. Gesneriaceæ (56). 90. Lentibulariaceæ (55).
91. Myoporaceæ (57).

Cohort XXIV. **Plantaginales.**

92. Plantaginaceæ (60).

Cohort XXV. **Rubiales.**

93. Rubiaceæ (37). 94. Caprifoliaceæ (36).

Cohort XXVI. **Campanulataæ.**

95. Cucurbitaceæ (31). 96. Campanulaceæ (41). 97. Goodeniaceæ (40). 98. Candellectaceæ (39). 99. Compositæ (38).
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II. LIST OF PLANTS NATURALISED IN NEW ZEALAND.

The extent to which an alien vegetation has become established in New Zealand has long been a familiar fact. Immediately after the discovery of the country and the establishment of intercourse with other parts of the world, a stream of foreign plants commenced to pour in; and when European settlers arrived, bringing with them their flocks and herds, and began to clear away the indigenous vegetation to make room for pastures and cultivated fields, the inrush of foreign weeds became still more marked, and their spread through the country still more rapid. At the present time there are many districts where the indigenous flora has been almost entirely supplanted by a crowd of hardy immigrants from the Northern Hemisphere; and there are few localities indeed, however remote, in which some species of foreign origin have not successfully established themselves. This is not the place to inquire into the reasons why the native vegetation is apparently unable to hold its own against these foreign intruders, or to discuss the many curious side-issues which at once arise when the subject is under consideration. Those who are interested in the matter should refer to Mr. Kirk's memoir "On the Displacement of Species in New Zealand" (Trans. N.Z. Inst. xxviii. 1), and to a paper of my own on "The Naturalised Plants of the Auckland Provincial District" (Trans. N.Z. Inst. xv. 268).

In the subjoined catalogue I have included all species of foreign origin known to me which appear to be thoroughly well established. I have purposely omitted several garden escapes and other plants which have been observed in small quantity only, or in a single locality, not wishing to encumber the list with the names of species which may fail to become permanent denizens. The total number of plants recorded is 528, belonging to 285 genera, and included in 66 orders. The orders best represented are *Gramineæ* with 81 species; *Compositæ*, 70; *Leguminosæ*, 49; *Cruciferae*, 35; *Caryophyllæ*, 26; and *Labiatae*, 20. With respect to their native country, no less than 425 come from some portion of the north temperate zone, including in the term Europe, North Asia, part of North Africa, and part of North America; 41 are of tropical origin, most of them having very wide ranges; 19 are from South Africa, and 20 from extratropical South America; while from Australia, notwithstanding its proximity to New Zealand, only 23 have been received.

Many of the naturalised plants included in the catalogue are now so widely distributed that they will be taken for true natives by any one unacquainted with their history, and I fear that the

pages of this work will be searched in vain for descriptions of them. A supplementary volume, containing short diagnoses of all such species, would doubtless be a great convenience to students, and I am not without hopes that I may be enabled to undertake the work. In the meantime, I have inserted in the catalogue references to good descriptions of each species, selecting books that are likely to be contained in the chief public libraries of the colony.

RANUNCULACEÆ.

- Ranunculus aquatilis*, Linn. Sp. Plant. 556; Benth. Illust. Handb. Brit. Fl. i. 11. *Water Buttercup*. South Island: Various localities in Canterbury, Dr. Cockayne. (Europe; North Asia; North America.)
- Ranunculus sceleratus*, Linn. Sp. Plant. 551; Hook. f. Student's Fl. 8. *Celery-leaved Buttercup*. North and South Islands: Damp pastures and waste places from Mongonui to Southland, local. (Throughout Europe; North and Central Asia.)
- Ranunculus acris*, Linn. Sp. Plant. 554; Hook. f. Student's Fl. 9. *Field Buttercup*. North and South Islands: Pastures and waste places throughout, but not common. (Europe; North Asia.)
- Ranunculus repens*, Linn. Sp. Plant. 554; Hook. f. Student's Fl. 9. *Creeping Buttercup*. North and South Islands: Pastures and waste places throughout. (Europe; North Asia; North America.)
- Ranunculus bulbosus*, Linn. Sp. Plant. 554; Hook. f. Student's Fl. 9. *Bulbous Buttercup*. North and South Islands: Pastures and waste places, abundant. (Europe; Western Asia; North Africa.)
- Ranunculus sardous*, Crantz, Stirp. Austr. 84; *R. hirsutus*, Curt.; Hook. f. Student's Fl. 10. *Hairy Buttercup*. North and South Islands: Pastures and waste places, common. (Europe; West Asia; North America.)
- Ranunculus parviflorus*, Linn. Syst. Nat. 1087; Hook. f. Student's Fl. 10. *Small-flowered Buttercup*. North and South Islands: Pastures and waste places, abundant. (Europe; West Asia; North Africa.)
- Ranunculus arvensis*, Linn. Sp. Plant. 555; Hook. f. Student's Fl. 10. *Corn Buttercup*. North and South Islands: Cultivated fields, not common. (Central and South Europe; West Asia.)
- Ranunculus muricatus*, Linn. Sp. Plant. 555; Hook. f. Fl. Brit. Ind. i. 20. North and South Islands: Waste places, local. (Europe; West Asia; temperate North America.)
- Ranunculus (Ceratocephalus) falcatus*, Linn. Sp. Plant. 556; Hook. f. Fl. Brit. Ind. i. 16. South Island: Dry localities in northern and Central Otago, Petrie! (South Europe; West Asia.)
- Nigella damascena*, Linn. Sp. Plant. 584. *Fennel Flower*. North Island: A garden escape in the vicinity of Auckland, rare. (South Europe.)
- Aquilegia vulgaris*, Linn. Sp. Plant. 533; Hook. f. Student's Fl. 13. *Columbine*. North and South Islands: A garden escape of tolerably frequent occurrence. (Temperate Europe and Asia.)
- Aconitum Napellus*, Linn. Sp. Plant. 532; Hook. f. Student's Fl. 13. *Monkshood*. South Island: Ashburton, W. W. Smith. (Europe; North and West Asia.)

PAPAVERACEÆ.

- Papaver hybridum*, Linn. Sp. Plant. 506; Hook. f. Student's Fl. 17. *Rough Poppy*. South Island: Ashburton, W. W. Smith. I have not seen New Zealand specimens. (Europe; West Asia; North Africa.)
- Papaver Argemone*, Linn. Sp. Plant. 506; Hook. f. Student's Fl. 17. *Pale Poppy*. South Island: Ashburton, W. W. Smith. (Europe; West Asia; North Africa.)

- Papaver dubium*, Linn. Sp. Plant. 1196; Hook. f. Student's Fl. 17. *Long-headed Poppy*. South Island: Otago, in cultivated fields, *Petrie!* (Europe; West Asia.)
- Papaver Rheas*, Linn. Sp. Plant. 507; Hook. f. Student's Fl. 17. *Field Poppy*. North and South Islands: Cornfields and waste places, not common. (Europe; West Asia; North Africa.)
- Papaver somniferum*, Linn. Sp. Plant. 508; Hook. f. Student's Fl. 18. *Opium Poppy*. North and South Islands: A garden escape, rare. (Commonly cultivated in the warm and temperate portions of Europe, Asia, and North Africa.)
- Glauadium flavum*, Crantz, Stirp. Austr. ii. 131; *G. luteum*, Scop.; Hook. f. Student's Fl. 19. North Island: Sandy beaches from the East Cape and Wanganui to Cook Strait. (Europe; West Asia; North Africa.)
- Chelidonium majus*, Linn. Sp. Plant. 505; Hook. f. Student's Fl. 18. *Celandine*. South Island: Ashburton, *W. W. Smith*. (Europe; Asia Minor to Persia.)
- Eschscholtzia californica*, Cham. in Hort. Phys. Berol. 74; Wats. Bot. Cal. i. 22. North and South Islands: A garden escape in light dry soils. (California.)
- Fumaria muralis*, Sond. ex Koch, Syn. Fl. Germ. 1017; *F. capreolata* sub-sp. *muralis*, Hook. f. Student's Fl. 20. *Fumitory*. Kermadec Islands, North and South Islands: Cultivated fields and waste places, not uncommon. (Europe; North Africa; West Asia.)
- Fumaria officinalis*, Linn. Sp. Plant. 700; Hook. f. Student's Fl. 20. *Fumitory*. North and South Islands: Cultivated fields, rare. (Europe; North Africa; West Asia.)

CRUCIFERÆ.

- Matthiola incana*, R. Br. in Ait. Hort. Kew, iv. 119; Hook. f. Student's Fl. 24. *Common Stock*. North Island: Cliffs at Castlepoint, Wellington, *Kirk!* (West Europe and all round the Mediterranean.)
- Cheiranthus Cheiri*, Linn. Sp. Plant. 661; Hook. f. Student's Fl. 24. *Wall-flower*. North and South Islands: A garden escape in several localities, but not common.
- Nasturtium officinale*, R. Br. in Ait. Hort. Kew, iv. 111; Hook. f. Student's Fl. 24. *Common Watercress*. North and South Islands, Stewart Island: Abundant in streams and wet places throughout. (Europe; West Asia; North Africa.)
- Barbarea praeox*, R. Br. in Ait. Hort. Kew, iv. 109; Hook. f. Student's Fl. 26. *Wintercress*. North and South Islands: Waste places and roadsides, not uncommon. (Europe.)
- Arabis hirsuta*, Scop. Fl. Carn. ii. 30; Hook. f. Student's Fl. 27. *Rockcress*. South Island: Ashburton, *W. W. Smith*. I have not seen New Zealand specimens. (Europe; temperate Asia; North America.)
- Alyssum calycinum*, Linn. Sp. Plant. 908; Hook. f. Student's Fl. 36. *Small Alyssum*. North and South Islands: Roadsides and waste places, not uncommon, ascending to 3000 ft. in Central Otago, *Petrie!* (Central and South Europe; West Asia.)
- Alyssum maritimum*, Lam. Encycl. i. 98; Hook. f. Student's Fl. 36. *Sweet Alyssum*. North and South Islands: Waste places and dry sandy soils near the sea, often abundant. (Europe.)
- Erophila vulgaris*, D.C. Syst. ii. 356; Hook. f. Student's Fl. 35. *Whitlow-grass*. South Island: Eastern and Central Otago, *Petrie!* (Europe; West Asia.)
- Cochlearia Armoracia*, Linn. Sp. Plant. 648; Hook. f. Student's Fl. 37. *Horse-radish*. North and South Islands: Deserted gardens and waste places, not uncommon. (Europe.)
- Hesperis matronalis*, Linn. Sp. Plant. 663; Hook. f. Student's Fl. 31. *Dame's Rocket*. North and South Islands: A garden escape. Poverty Bay, *Bishop Williams!* near Wellington, *Kirk!* Oamaru, *Petrie!* (Europe; West Asia.)

- Malcolmia maritima*, R. Br. in Ait. Hort. Kew, iv. 121. North Island: Waste places near Wellington, *Kirk!* (South Europe.)
- Sisymbrium Sophia*, Linn. Sp. Plant. 659; Hook. f. Student's Fl. 29. *Flax-weed*. South Island: Central Otago, *Petrie!* (North Europe; North and Central Asia; North Africa; North and South America.)
- Sisymbrium officinale*, Scop. Fl. Carn. 26; Hook. f. Student's Fl. 30. *Hedge-mustard*. North and South Islands: Roadsides and waste places, plentiful. (Europe; North Asia.)
- Camelina sativa*, Crantz, Stirp. Austr. i. 18; Hook. f. Student's Fl. 37. *Gold of Pleasure*. North and South Islands: Cultivated fields, rare. *Remu-ra*, T. F. C.; Oamaru, *Petrie!* (Europe; West Asia.)
- Brassica oleracea*, Linn. Sp. Plant. 667; Hook. f. Student's Fl. 31. *Wild Cabbage*. North and South Islands: Abundant on sea-cliffs. (Coasts of South and West Europe.)
- Brassica campestris*, Linn. Sp. Plant. 666; Hook. f. Student's Fl. 32. *Swede*. North and South Islands: Not uncommon in cultivated fields. (Europe.)
- Brassica Rapa*, Linn. Sp. Plant. 666; *B. campestris* var. *Rapa*, Hook. f. Student's Fl. 32. *Turnip*. North and South Islands: Cultivated fields, not uncommon. (Europe.)
- Brassica Napus*, Linn. Sp. Plant. 666; *B. campestris* var. *oleifera*, Hook. f. Student's Fl. 32. *Rape*. North and South Islands: Abundant in cultivated fields. (Europe.)
- Brassica nigra*, Koch, in Roehl. Deutschl. Fl. 713; Hook. f. Student's Fl. 32. *Black Mustard*. North and South Islands: Cultivated fields and waste places, not uncommon. (Europe; North and West Asia.)
- Brassica adpressa*, Boiss. Voy. Espagne, ii. 38; Hook. f. Student's Fl. 33. North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia.)
- Brassica Sinapistrum*, Boiss. Voy. Espagne, ii. 39; Hook. f. Student's Fl. 33. *Charlock*. North and South Islands: Cultivated fields and waste places, not common. (Europe; North and West Asia; North Africa.)
- Brassica alba*, Boiss. Voy. Espagne, ii. 39; Hook. f. Student's Fl. 33. *White Mustard*. North and South Islands: Cultivated fields and waste places, not common. (Europe; North and West Asia; North Africa.)
- Diplotaxis muralis*, D.C. Syst. ii. 634; Hook. f. Student's Fl. 33. *Wall-mustard*. North and South Islands: Waste places, local. (Europe; North Africa.)
- Eruca sativa*, Lam. Fl. Franc. ii. 496. North Island: Port Fitzroy (Great Barrier Island), *Kirk!* (South Europe; West Asia.)
- Capsella Bursa-pastoris*, Medic. Pflanzeng. 85; Hook. f. Student's Fl. 38. *Shepherd's Purse*. North and South Islands, Chatham Islands, Stewart Island: Roadsides, waste places, &c., an abundant weed. (Europe; North and West Asia; North Africa.)
- Senecbiera didyma*, Pers. Syn. ii. 185; Hook. f. Student's Fl. 39. *Wart-cress*. North and South Islands, Stewart Island: An abundant weed in waste places, especially near the sea. (Originally from South America; now spread over the whole world.)
- Senecbiera Coronopus*, Poir. Encycl. vii. 76; Hook. f. Student's Fl. 39. *Wart-cress*. North and South Islands: Waste places, not nearly so plentiful as the preceding. (A cosmopolitan weed.)
- Lepidium Draba*, Linn. Sp. Plant. 645; Hook. f. Student's Fl. 40. *Hoary Cress*. South Island: Asbburton, *W. W. Smith!* (Southern Europe; West Asia.)
- Lepidium campestre*, R. Br. in Ait. Hort. Kew, iv. 88; Hook. f. Student's Fl. 40. *Field-cress*. North and South Islands: Cultivated fields and waste places, not common. (Europe; West Asia; North Africa.)
- Lepidium hirtum*, Sm. Comp. Fl. Brit. 98; *L. Smithii*, Hook. f. Student's Fl. 40. North and South Islands: Cultivated fields, roadsides, &c., local. (Europe.)
- Lepidium rudemale*, Linn. Sp. Plant. 645; Hook. f. Student's Fl. 39. *Narrow-*

- leaved Cress*. North and South Islands: Waste places and roadsides, plentiful, especially near the sea. (Europe; North and West Asia.)
- Lepidium sativum*, Linn. Sp. Plant. 644. *Garden-cress*. North and South Islands: A garden escape, rare. (Europe; but not known in an indigenous state.)
- Iberis amara*, Linn. Sp. Plant. 649; Hook. f. Student's Fl. 41. *Candytuft*. North and South Islands: A garden escape, far from common. (Europe.)
- Rapistrum rugosum*, All. Fl. Pedem. i. 257. North Island: Once very plentiful in waste places within the confines of the City of Auckland, now nearly extinct. (South Europe; West Asia.)
- Raphanus sativus*, Linn. Sp. Plant. 669. *Common Radish*. North and South Islands: A garden escape, not uncommon. (Europe; and naturalised in most warm and temperate regions.)

RESEDACEÆ.

- Reseda Luteola*, Linn. Sp. Plant. 448; Hook. f. Student's Fl. 45. *Dyer's Weed*. North and South Islands: Fields and waste places, not uncommon. (Europe; West Asia; North Africa.)
- Reseda lutea*, Linn. Sp. Plant. 449; Hook. f. Student's Fl. 45. *Cut-leaved Mignonette*. North Island: Fields at Pukeroro, *J. D. P. Morgan!* (Europe; West Asia; North Africa.)
- Reseda alba*, Linn. Sp. Plant. 449; Hook. f. Student's Fl. 45. *White Mignonette*. North and South Islands: Poverty Bay, *Bishop Williams!* Canterbury, *Kirk!* (Europe; West Asia; North Africa.)

VIOLARIÆ.

- Viola tricolor*, Linn. Sp. Plant. 935; Hook. f. Student's Fl. 49. *Pansy*. North and South Islands: Cultivated fields and waste places, local. (North Europe to Siberia and North-west India; North Africa.)
- Viola tricolor* var. *arvensis*, Murr.; Hook. f. Student's Fl. 49. North and South Islands: Cultivated fields, not common.
- Ionidium filiforme*, F. Muell. Pl. Vict. i. 66.; Benth. Fl. Austral. i. 103. North Island: Grassy places near Lake Takapuna, Auckland, *Miss Rolleston!* (Australia.)

POLYGALEÆ.

- Polygala myrtifolia*, Linn. Sp. Plant. 703; Harv. & Sond. Fl. Cap. i. 83. North Island: A garden escape in several localities near Auckland, *T. F. C.*; near Napier, *Colenso!* (Cape Colony.)

CARYOPHYLLÆ.

- Tunica prolifera*, Scop. Fl. Carn. i. 299; *Dianthus prolifer*, Linn. Sp. Plant. 410; Hook. f. Student's Fl. 53. South Island: Ashburton, *W. W. Smith*. I have not seen New Zealand specimens. (Europe; West Asia to the Caucasus.)
- Dianthus Armeria*, Linn. Sp. Plant. 410; Hook. f. Student's Fl. 53. *Deptford Pink*. North and South Islands: Pastures and waste places, not common. (Europe; West Asia to the Caucasus.)
- Dianthus barbatus*, Linn. Sp. Plant. 409. *Sweet-william*. North and South Islands: A garden escape, not common. (Europe.)
- Saponaria Vaccaria*, Linn. Sp. Plant. 409. North Island: Cultivated fields near Auckland and Wellington, *Kirk!* (Europe; West Asia.)
- Silene inflata*, Sm. Fl. Brit. 467; *S. Cucubalus*, Wibel; Hook. f. Student's Fl. 55. *Bladder-campion*. North and South Islands: Cultivated fields, roadsides, &c., not common. (Europe; and northwards to Siberia and southwards to India.)
- Silene conica*, Linn. Sp. Plant. 418; Hook. f. Student's Fl. 55. South Island: Otago, *Petrie!* (Europe; West Asia; Algeria.)

- Silene gallica*, Linn. Sp. Plant. 417; Hook. f. Student's Fl. 55. *Catchfly*. North and South Islands, Stewart Island, Chatham Islands: Common throughout. (Europe; North and West Asia; North Africa.)
- Silene nocturna*, Linn. Sp. Plant. 416. North Island: Karori, near Wellington, Kirk! (South Europe; West Asia; North Africa.)
- Silene nutans*, Linn. Sp. Plant. 417; Hook. f. Student's Fl. 56. *Nodding Catchfly*. North Island: Pastures at Matamata, Thames Valley, T. F. C. (Europe; North and West Asia; Canary Islands.)
- Lychnis Flos-cuculi*, Linn. Sp. Plant. 436; Hook. f. Student's Fl. 57. *Ragged Robin*. North and South Islands: Pastures, rare. Whangarei, T. F. C.; Ashburton, W. W. Smith. (North Europe; Siberia.)
- Lychnis vespertina*, Sibth. Fl. Oxon. 146; Hook. f. Student's Fl. 57. *White Campion*. South Island: Fields and roadsides, rare. Ashburton, W. W. Smith; near Dunedin, Petrie. (Europe; West Asia; North Africa.)
- Lychnis coronaria*, Desr. in Lam. Encycl. iii. 643. *Rose Campion*. North and South Islands: An occasional outcast from gardens. (South Europe; Asia Minor and eastwards to the Himalayas.)
- Lychnis Githago*, Scop. Fl. Carn. i. 310; *Githago segetum*, Desf.; Hook. f. Student's Fl. 58. *Corn-cockle*. North and South Islands: Cultivated fields, not uncommon. (Europe; Russian Asia.)
- Cerastium glomeratum*, Thuill. Fl. Par. ed. ii. 226; Hook. f. Student's Fl. 59. *Mouse-ear*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)
- Cerastium triviale*, Link, Enum. Hort. Berol. i. 433; Hook. f. Student's Fl. 60. *C. truncatulum*, Col. in Trans. N.Z. Inst. xxv. (1893) 327, and *C. amblyodontum*, Col. l.c. xxvii. (1895) 384. *Larger Mouse-ear*. North and South Islands, Stewart Island, Chatham Islands: An abundant weed. (Distribution of the preceding.)
- Stellaria media*, Cyr. Char. Comm. (1784) 36; Hook. f. Student's Fl. 62. *Chickweed*. Kermadec Islands southwards to Macquarie Island: A most abundant weed. (Originally from North Europe and Asia, now found in all temperate and cold climates.)
- Stellaria holostea*, Linn. Sp. Plant. 422; Hook. f. Student's Fl. 62. *Stitchwort*. South Island: Ashburton, W. W. Smith. (Europe; West Asia.)
- Stellaria graminea*, Linn. Sp. Plant. 422; Hook. f. Student's Fl. 62. *Lesser Stitchwort*. North and South Islands: Fields and roadsides, not common. (Europe; North and West Asia.)
- Stellaria uliginosa*, Murr. Prodr. Stirp. Gotting. 55; Hook. f. Student's Fl. 63. South Island: Bogs near Westport, Townson! Ruapuke Island (in Foveaux Strait), C. Traill. (North Europe; North and West Asia; North Africa; North America.)
- Arenaria serpyllifolia*, Linn. Sp. Plant. 423; Hook. f. Student's Fl. 64. *Sund-wort*. North and South Islands: Abundant in light dry soils. (Europe; West Asia to the Himalayas.)
- Sagina procumbens*, Linn. Sp. Plant. 128; Hook. f. Student's Fl. 66. *S. truncata*, Col. in Trans. N.Z. Inst. xxvii (1895) 386. *Pearl-wort*. North and South Islands, Stewart Island: A common weed in damp places. (Europe; North and West Asia to the Himalayas; North Africa; temperate North and South America.)
- Sagina apetala*, Linn. Mant. ii. 559; Hook. f. Student's Fl. 66. *Pearl-wort*. North and South Islands, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)
- Spergula arvensis*, Linn. Sp. Plant. 440; Hook. f. Student's Fl. 67. *Spurrey*. North and South Islands: Cultivated fields and waste places, abundant. (Europe; West Asia to India; North Africa.)
- Spergula pentandra*, Linn. Sp. Plant. 440. North Island: Naturalised near Wellington, Kirk. I have not seen New Zealand specimens. (Europe; West Africa to India.)

- Spergularia rubra*, J. and C. Presl. Fl. Cech. 94; Hook. f. Student's Fl. 68. *Sands-purrey*. North and South Islands: Roadsides and waste places, abundant. (Most temperate countries.)
- Polycarpon tetraphyllum*, Linn. Syst. 881; Hook. f. Student's Fl. 69. Kermadec Islands, North and South Islands, Stewart Island: Roadsides and waste places, abundant on dry soils. (Europe; West Asia; North Africa.)

PORTULACÆ.

- Portulaca oleracea*, Linn. Sp. Plant. 445; Benth. Fl. Austral. i. 169. *Purslane*. North Island: Abundant in warm dry soils as far south as the East Cape, rare and local from thence to Cook Strait. (All warm climates.)
- Claytonia perfoliata*, Donn. ex Willd. Sp. Plant. 1186; Hook. f. Student's Fl. 70. South Island: A garden escape, rare. Cheviot, *Haast!* near Dunedin, *G. M. Thomson*. (North-west America.)
- Calandrinia caulescens*, H. B. K. Nov. Gen. et Sp. vi. 78, t. 526. North and South Islands: Cultivated fields, rare and local. Otahuhu, *T. F. C.*; near Christchurch, *Kirk*. (Peru.)

HYPERICINÆ.

- Hypericum Androsæum*, Linn. Sp. Plant. 784; Hook. f. Student's Fl. 72. *Tutsan*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; West Asia; North Africa.)
- Hypericum perforatum*, Linn. Sp. Plant. 785; Hook. f. Student's Fl. 72. *St. John's Wort*. North and South Islands: Abundant. (Europe; North and West Asia to China and India; North Africa.)
- Hypericum humifusum*, Linn. Sp. Plant. 785; Hook. f. Student's Fl. 73. *Trailing Hypericum*. North and South Islands: Common, especially on clay soils. (Europe; India; Canary Islands.)

MALVACEÆ.

- Althæa officinalis*, Linn. Sp. Plant. 686; Hook. f. Student's Fl. 75. *Marsh-mallow*. South Island: Ashburton, *W. W. Smith*. I have not seen New Zealand specimens. (Europe; North and West Asia to the Himalayas; North Africa.)
- Lavatera arborea*, Linn. Sp. Plant. 690; Hook. f. Student's Fl. 76. *Tree-mallow*. North and South Islands: An occasional garden escape. (Coasts of West and South Europe.)
- Malva sylvestris*, Linn. Sp. Plant. 689; Hook. f. Student's Fl. 76. *Common Mallow*. North and South Islands: Roadsides and waste places, not common. (Europe; North and West Asia to China and India; North Africa.)
- Malva rotundifolia*, Linn. Sp. Plant. 688; Hook. f. Student's Fl. 76. *Dwarf Mallow*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to the Himalayas.)
- Malva parviflora*, Linn. Amœn. Acad. ii. 416; D.C. Prodr. i. 433. North and South Islands: Roadsides and waste places, abundant. (Europe; West Asia to India and China; North Africa.)
- Malva verticillata*, Linn. Sp. Plant. 689; D.C. Prodr. i. 433. North and South Islands: Waste places, abundant. (Europe; North and West Asia to China and India; North Africa.)
- Malva crispa*, Linn. Syst. Nat. 1147; D.C. Prodr. i. 433. North Island: A garden escape at Port Waikato, *Kirk*. (Europe; West Asia.)
- Modiola multifida*, Moench. Meth. 620; Asa Gray, Man. 58. North and South Islands: Pastures and roadsides, abundant. (Eastern States of North America.)

LINEÆ.

- Linum marginale*, A. Cunn. ex Hook. Lond. Journ. Bot. vii. (1848) 169; Benth. Fl. Austral. i. 283. North and South Islands: Generally distributed, but most plentiful in the North Island. (Australia.)
- Linum usitatissimum*, Linn. Sp. Plant. 277; Hook. f. Student's Fl. 78. *Common Flax*. North and South Islands: Occasionally seen as an escape from cultivation. (Europe; West Asia to India.)
- Linum gallicum*, Linn. Sp. Plant. 401; D.C. Prodr. i. 423. North Island: Fields and waste places as far south as the East Cape. (South Europe; North Africa.)
- Linum catharticum*, Linn. Sp. Plant. 281; Hook. f. Student's Fl. 78. *Purging Flax*. North and South Islands: Fields and waste places, not common. (Europe; West Asia to Persia; Canary Islands.)

GERANIACEÆ.

- Geranium Robertianum*, Linn. Sp. Plant. 681; Hook. f. Student's Fl. 82. *Herb-robert*. North and South Islands: Fields and waste places, not common. (Europe; North and West Asia to India.)
- Erodium cicutarium*, L'Herit. ex Ait. Hort. Kew, ii. 414; Hook. f. Student's Fl. 83. *Stork's-bill*. North and South Islands, Stewart Island, Chatham Islands: Cultivated fields and waste places, abundant. (Europe; North and West Asia to India; North Africa.)
- Erodium moschatum*, L'Herit. l.c.; Hook. f. l.c. *Musky Stork's-bill*. North and South Islands: Roadsides and waste places, abundant. (Europe; West Asia; North Africa.)
- Erodium malachoides*, Willd. Phyt. 10; D.C. Prodr. i. 648. North Island: In sandy places near the sea. Mongonui and the Bay of Islands, *T. F. C.*; Wellington, *Kirk!* (South Europe; West Asia to India; North Africa.)
- Pelargonium zonale*, L'Herit. ex Ait. Hort. Kew, ii. 424; Harv. and Sond. Fl. Cap. i. 298. North Island: Often persisting for some years in deserted gardens. (Cape Colony.)
- Pelargonium quercifolium*, L'Herit. Ger. t. 14; Harv. and Sond. Fl. Cap. i. 306. North Island: An occasional garden escape. (Cape Colony.)
- Tropæolum majus*, Linn. Sp. Plant. 345; D.C. Prodr. i. 683. *Indian Cress*. North Island: A garden escape, not uncommon in the Auckland District and southwards to New Plymouth. (Peru.)
- Oxalis cernua*, Thunb. Diss. Oxal. 14; Harv. and Sond. Fl. Cap. i. 348. North Island: An occasional weed in gardens and orchards. (Cape Colony.)
- Oxalis variabilis*, Jacq. Oxal. 89; Harv. and Sond. Fl. Cap. i. 331. North Island: A garden escape, not common. (Cape Colony.)
- Oxalis hirta*, Linn. Sp. Plant. 434; Harv. and Sond. Fl. Cap. i. 343. North Island: A garden escape in the vicinity of Auckland, rare. (Cape Colony.)

AMPELIDÆ.

- Vitis vinifera*, Linn. Sp. Plant. 202; D.C. Prodr. i. 633. *Vine*. North Island: Often lingers in deserted gardens, old Maori cultivations, &c. (West Asia.)

SAPINDACEÆ.

- Melianthus major*, Linn. Sp. Plant. 639; Harv. and Sond. Fl. Cap. i. 367. North Island: Not uncommon as a garden escape. (Cape Colony.)

LEGUMINOSÆ.

- Lupinus arboreus*, Sims, Bot. Mag. t. 682; Watson, Bot. Calif. i. 117. *Tree Lupine*. North and South Islands: Often planted to arrest drifting sands, and increasing in some localities. (California.)

- Ulex europæus*, Linn. Sp. Plant. 241; Hook. f. Student's Fl. 92. *Gorse, Furze.* North and South Islands, Stewart Island: Abundant throughout. (Europe; Canary Islands and the Azores.)
- Cytisus scoparius*, Link, Enum. Hort. Berol. ii. 241; Hook. f. Student's Fl. 92. *Common Broom.* North and South Islands: Not uncommon throughout. (Europe; North Asia; Canary Islands and the Azores.)
- Cytisus albus*, Link, Enum. Hort. Berol. ii. 241; D.C. Prodr. ii. 153. *White Broom.* North and South Islands: An occasional escape from gardens. (South Europe.)
- Cytisus candicans*, Lam. Fl. Fr. ii. 623. North and South Islands: Abundant. (South Europe; North Africa.)
- Medicago sativa*, Linn. Sp. Plant. 778; Hook. f. Student's Fl. 95. *Lucerne, Alfalfa.* North and South Islands: An escape from cultivation. (South Europe.)
- Medicago lupulina*, Linn. Sp. Plant. 779; Hook. f. Student's Fl. 95. *Black Medick.* North and South Islands: Fields and waste places, plentiful. (Europe; North and West Asia to India; North Africa.)
- Medicago denticulata*, Willd. Sp. Plant. iii. 1414; Hook. f. Student's Fl. 95. *Toothed Medick.* North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)
- Medicago maculata*, Willd. Sp. Plant. iii. 1412; Hook. f. Student's Fl. 95. *Spotted Medick.* North Island: Abundant in the Auckland Provincial District, local elsewhere. (Europe; West Asia; North Africa.)
- Melilotus officinalis*, Lam. Fl. Fr. ii. 594; Benth. Illust. Handb. Brit. Fl. i. 193. *Common Melilot.* North and South Islands: Sparingly naturalised in fields and waste places. (Europe; West Asia to the Himalayas.)
- Melilotus arvensis*, Wallr. Sched. Crit. 391; Benth. Illust. Handb. Brit. Fl. i. 194. *Field Melilot.* North and South Islands, Chatham Islands: Roadsides and waste places, plentiful. (Europe; North and West Asia; North Africa.)
- Melilotus alba*, Desr. in Lam. Encycl. iv. 63; Hook. f. Student's Fl. 96. *White Melilot.* North and South Islands: Waste places, rare. Napier, Kirk, T. F. C.; Canterbury Plains, Kirk, W. W. Smith. (Europe; North and West Asia to India.)
- Trifolium subterraneum*, Linn. Sp. Plant. 767; Hook. f. Student's Fl. 97. North Island: Waste places in the Auckland District, rare. (Europe; West Asia; North Africa.)
- Trifolium arvense*, Linn. Sp. Plant. 769; Hook. f. Student's Fl. 97. *Hare's-foot Clover.* North and South Islands: Roadsides and waste places, increasing, especially in light dry soils. (Europe; North and West Asia; North Africa.)
- Trifolium incarnatum*, Linn. Sp. Plant. 769; Hook. f. Student's Fl. 97. *Crimson Clover.* North and South Islands: Pastures, rare. (South and West Europe.)
- Trifolium ochroleucum*, Huds. Fl. Angl. 283; Hook. f. Student's Fl. 98. *Sulphur Clover.* South Island: Ashburton, W. W. Smith. I have not seen New Zealand specimens. (West and South Europe; West Asia.)
- Trifolium pratense*, Linn. Sp. Plant. 768; Hook. f. Student's Fl. 98. *Red Clover.* North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia to India; North Africa.)
- Trifolium medium*, Linn. Fauna Suec. ed. ii. 558; Hook. f. Student's Fl. 98. *Zigzag Clover.* North and South Islands: Pastures, meadows, &c., not uncommon. (Europe; North and West Asia.)
- Trifolium scabrum*, Linn. Sp. Plant. 770; Hook. f. Student's Fl. 99. *Rough Clover.* North Island: Pastures and waste places, local. (Europe; West Asia; North Africa.)

- Trifolium glomeratum*, Linn. Sp. Plant. 770; Hook. f. Student's Fl. 99. *Clustered Clover*. North and South Islands: Pastures and waste places, plentiful. (Europe; West Asia; North Africa.)
- Trifolium hybridum*, Linn. Sp. Plant. 766; Hook. f. Student's Fl. 100. *Alsike Clover*. North and South Islands: Pastures, meadows, &c., not uncommon. (Europe; West Asia; North Africa.)
- Trifolium repens*, Linn. Sp. Plant. 767; Hook. f. Student's Fl. 100. *White Clover*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Plentiful throughout. (Europe; North and West Asia to India; North Africa.)
- Trifolium fragiferum*, Linn. Sp. Plant. 772; Hook. f. Student's Fl. 100. *Strawberry Clover*. North Island: Fields and waste places in the Auckland District, rare. (Europe; North and West Asia; North Africa.)
- Trifolium resupinatum*, Linn. Sp. Plant. 771; Benth. Illust. Handb. Brit. Fl. i. 205. *Reversed Clover*. North Island: Fields and waste places; very plentiful in the North Cape district, and increasing elsewhere. (Europe; West Asia to the Caucasus.)
- Trifolium agrarium*, Linn. Sp. Plant. 772. South Island: Broken River Basin (Canterbury), Kirk! (Central Europe.)
- Trifolium procumbens*, Linn. Sp. Plant. 772; Hook. f. Student's Fl. 101. *Hop Trefoil*. North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)
- Trifolium dubium*, Sibth. Fl. Oxon. 231; Hook. f. Student's Fl. 101. *Yellow Suckling*. North and South Islands, Stewart Island, Chatham Islands: Plentiful. (Europe; North Africa.)
- Trifolium filiforme*, Linn. Sp. Plant. 773; Hook. f. Student's Fl. 101. *Lesser Trefoil*. South Island: Various localities in Otago and Southland, not common. (Europe; West Asia to the Caucasus.)
- Anthyllis vulneraria*, Linn. Sp. Plant. 719; Hook. f. Student's Fl. 102. *Kidney-vetch*. South Island: Sparingly naturalised near Nelson and Dunedin, Kirk. (Europe; West Asia; North Africa.)
- Lotus corniculatus*, Linn. Sp. Plant. 775; Hook. f. Student's Fl. 102. *Bird's-foot Trefoil*. North and South Islands: Fields and roadsides, not uncommon. (Europe; North and West Asia to India; North Africa.)
- Lotus uliginosus*, Schkuhr, Handb. ii. 412; Hook. f. Student's Fl. 103. *Greater Bird's-foot Trefoil*. North and South Islands: Fields and waste places, abundant, especially in the Auckland District. (Europe; West Asia; North Africa.)
- Lotus angustissimus*, Linn. Sp. Plant. 774; Hook. f. Student's Fl. 103. *Slender Bird's-foot Trefoil*. North Island: In several localities near Auckland, rare, T. F. C. (Europe; West Asia.)
- Indigofera viscosa*, Lam. Encycl. iii. 247; D.C. Prodr. ii. 227. North Island: Has been noticed as a garden escape near Auckland, but is scarcely naturalised. (India to Malaya and North Australia; tropical Africa.)
- Galega officinalis*, Linn. Sp. Plant. 714; D.C. Prodr. ii. 248. *Goat's Rue*. North Island: Manawatu River-bed, H. J. Matthews! (South Europe; West Asia; North Africa.)
- Robinia Pseud-acacia*, Linn. Sp. Plant. 722; Asa Gray, Man. 96. *Locust-tree*. North Island: Naturalised in various localities between Auckland and the Upper Waikato. (United States.)
- Coronilla varia*, Linn. Sp. Plant. 743; D.C. Prodr. ii. 310. South Island: A garden escape in the vicinity of Nelson, T. F. C. (South Europe; West Asia.)
- Onobrychis viciifolia*, Scop. Fl. Carn. ii. 76; *O. sativa*, Lam.; Hook. f. Student's Fl. 106. *Sainfoin*. North and South Islands: An occasional escape from cultivation, but scarcely naturalised. (Europe; North and West Asia.)

- Vicia gemella*, Crantz, Stirp. Austr. ed. ii. v. 389; *V. tetrasperma*, Moench; Hook. f. Student's Fl. 107. *Slender Tare*. North and South Islands: Roadsides, hedges, &c., not uncommon. (Europe; North and West Asia to India; North Africa.)
- Vicia gracilis*, Lois. Fl. Gall. 460. South Island: Taiari Plain, *G. M. Thomson*! (Central and South Europe.)
- Vicia hirsuta*, S. F. Gray, Nat. Arr. Brit. Pl. ii. 614; Hook. f. Student's Fl. 107. *Common Tare*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia; North Africa.)
- Vicia Cracca*, Linn. Sp. Plant. 735; Hook. f. Student's Fl. 107. *Tufted Vetch*. South Island: Opawa River, Marlborough, *Kirk*. (Europe; North and West Asia to India; North Africa; North America.)
- Vicia sativa*, Linn. Sp. Plant. 736; Hook. f. Student's Fl. 109. *Common Vetch*. North and South Islands: Cultivated fields and waste places, abundant. (South Europe; North and West Asia; North Africa.)
- Vicia narbonensis*, Linn. Sp. Pl. 737; D.C. Prodr. ii. 364. North Island: Port Fitzroy (Great Barrier Island), *Kirk*! (South Europe.)
- Lens esculenta*, Moench. Meth. 131. *Common Lentil*. North Island: Naturalised in the Auckland Domain for many years, but does not spread. (South Europe.)
- Lathyrus odoratus*, Linn. Sp. Plant. 732; D.C. Prodr. ii. 374. *Sweet-pea*. North Island: An occasional garden escape in rich warm soils, but soon disappears. (South Europe.)
- Lathyrus latifolius*, Linn. Sp. Plant. 733; D.C. Prodr. ii. 370. *Everlasting Pea*. North Island: An occasional garden escape. (Europe.)
- Acacia decurrens*, Willd. Sp. Plant. iv. 1072; Benth. Fl. Austral. ii. 414. *Black Wattle*. North Island: Largely planted for tanning purposes, and has established itself in several localities. (Australia.)
- Acacia dealbata*, Link. Enum. Hort. Berol. 445; Benth. Fl. Austral. ii. 415. *Silver Wattle*. North Island: Established in several localities in the Auckland District. (Australia.)
- Albizia lophantha*, Benth. in Hook. Lond. Journ. Bot. iii. 86; Fl. Austral. ii. 421. *Brush Wattle*. North Island: Naturalised in many localities, especially in the Auckland Provincial District. (Australia.)

ROSACEÆ.

- Prunus Persica*, Stokes, Bot. Mat. Med. iii. 100; *Amygdalus Persica*, Linn. Sp. Plant. 472. *Peach*. North Island: Copiously naturalised in the Auckland Provincial District in the early period of settlement, but at the present time rarely spreads out of cultivation. (Originally from China or Central Asia.)
- Prunus Cerasus*, Linn. Sp. Plant. 474; Hook. f. Student's Fl. 115. *Cherry*. North and South Islands: Maintains itself in old Maori plantations and deserted orchards, sometimes forming small groves. (South Europe; Western Asia.)
- Rubus idæus*, Linn. Sp. Plant. 492; Hook. f. Student's Fl. 117. *Raspberry*. North and South Islands: An occasional escape from cultivation, not common. (Europe; North and West Asia; North Africa.)
- Rubus fruticosus*, Linn. Sp. Plant. 493; Hook. f. Student's Fl. 117. *Bramble*; *Blackberry*. North and South Islands: Copiously naturalised throughout, and in many localities a serious pest. Several of the subspecies or varieties have been introduced, the following being the most prominent: *R. discolor*, Weihe and Nees; *R. leucostachys*, Smith; *R. rusticanus*, Weihe; and *R. macrophyllus*, Weihe. (Europe; North and West Asia to the Himalayas; North Africa.)
- Fragaria vesca*, Linn. Sp. Plant. 494; Hook. f. Student's Fl. 123. *Wild Strawberry*. North and South Islands: An occasional garden escape, not common. (Europe; West Asia; North America.)
- Fragaria elatior*, Ehr. Beitr. vii. 23; Hook. f. Student's Fl. 123. *Hautbois*

- Strawberry*. North and South Islands: Has been noticed as a garden escape, but is much rarer than the preceding. (Europe; West Asia.)
- Potentilla reptans*, Linn. Sp. Plant. 499; Hook. f. Student's Fl. 125. *Cinquefoil*. North and South Islands: Waysides and pastures, local. Near Hamilton, T. F. C.; Wellington and Akaroa, Kirk! (Europe; North and West Asia to the Himalayas; Canary Islands and the Azores.)
- Asplenium arvense*, Scop. Fl. Carn. i. 115; Hook. f. Student's Fl. 127. *Parsley Piert.* North and South Islands: Waste places and fields, often abundant in light dry soils. (Europe; West Asia; North Africa.)
- Acæna ovina*, A. Cunn. in Field's N.S. Wales, 358; Benth. Fl. Austral. ii. 433. North and South Islands: Fields and waste places, not uncommon. (Australia.)
- Poterium Sanguisorba*, Linn. Sp. Plant. 994; Hook. f. Student's Fl. 128. *Burnet*. North and South Islands: Dry pastures, not common. (Europe; North and West Asia to India; North Africa.)
- Poterium polygamum*, Waldest. and Kit. Pl. Rar. Hung. ii. 217, t. 198; *P. muricatum*, Spach; Hook. f. Student's Fl. 129. *Burnet*. South Island: Near Lake Ellesmere and elsewhere on the Canterbury Plains, Kirk! (South Europe.)
- Rosa rubiginosa*, Linn. Mant. ii. 564; Hook. f. Student's Fl. 131. *Sweetbriar*. North and South Islands: Abundant throughout. (Europe; North and West Asia to the Himalayas.)
- Rosa canina*, Linn. Sp. Plant. 492; Hook. f. Student's Fl. 132. *Dog-rose*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North Asia; North Africa.)
- Rosa multiflora*, Thunb. Fl. Jap. 214. North Island: Often lingering for years in deserted gardens, &c. (China; Japan.)
- Cratægus Oxyacantha*, Linn. Sp. Plant. 477; Hook. f. Student's Fl. 137. *Hawthorn*. North and South Islands: Scarcely naturalised, but seedlings sometimes appear in the vicinity of planted hedges. (Europe; North and West Asia to the Himalayas; North Africa.)

SAXIFRAGÆÆ.

- Ribes Grossularia*, Linn. Sp. Plant. 201; Hook. f. Student's Fl. 144. *Gooseberry*. North and South Islands: A garden escape of frequent occurrence, especially in the South Island. (Europe; North and West Asia; Himalayas; North Africa.)

CRASSULACEÆ.

- Tillæa trichotoma*, Walp. Rep. ii. 251; Harv. and Sond. Fl. Cap. ii. 330. North Island: Roadsides near Auckland, T. F. C.; Wanganui, E. W. Andrews! (Cape Colony.)

MYRTACEÆ.

- Eucalyptus globulus*, Labill. Voy. i. 153, t. 13; Benth. Fl. Austral. iii. 225. *Blue-gum*. North Island: Seedlings frequently appear in the vicinity of plantations. (Australia.)

LYTHRARIÆÆ.

- Peplis Portula*, Linn. Sp. Plant. 332; Hook. f. Student's Fl. 155. *Water-purslane*. South Island: Various localities in the east of Otago, Petrie! (Europe; North Africa.)
- Lythrum Hyssopifolia*, Linn. Sp. Plant. 447; Hook. f. Student's Fl. 154. *Hyssop Loosestrife*. North and South Islands: Moist places, ditches, &c., abundantly naturalised. (Europe; North and West Asia; North Africa.)
- Lythrum Græfferi*, Tenore, Prod. Fl. Nap. lxxviii. North and South Islands: Various localities in the Auckland District, Kirk! T. F. C.; Greymouth, Helms! (South Europe; North Africa.)

ONAGRARIÆ.

- Oenothera biennis*, Linn. Sp. Plant. 346; Hook. f. Student's Fl. 159. *Evening Primrose*. North and South Islands: Roadsides and waste places, not common. (North America.)
- Oenothera odorata*, Jacq. Ic. Plant. Rar. iii. 3, t. 456; Hook. f. Student's Fl. 159. *Evening Primrose*. North Island: Abundant in light dry soils and sandy places near the sea. (Chili; Patagonia.)
- Oenothera tetraptera*, Cav. Ic. iii. 40, t. 279. North Island: A garden escape near Auckland, rare. (Mexico.)

CUCURBITACEÆ.

- Lagenaria vulgaris*, Ser. in Mem. Soc. Phys. Genev. iii. 25; Hook. f. Fl. Brit. Ind. ii. 613. *Gourd*; *Hue*. North Island: Brought by the Maoris from Polynesia when they first colonised New Zealand, and still cultivated by them. (Native country uncertain; cultivated everywhere in the tropics.)
- Citrullus vulgaris*, Schrad. ex Eckl. and Zeyh. Enum. 279; Hook. f. Fl. Brit. Ind. ii. 621. *Water-melon*. North Island: Occasionally lingers in old Maori cultivations, but scarcely naturalised. (Tropical Africa; cultivated in all warm countries.)

FICOIDEÆ.

- Mesembryanthemum edule*, Linn. Syst. ed. x. 1060; Harv. and Sond. Fl. Cap. ii. 412. North Island: Often planted to check the advance of drifting sands, and spreading in several localities, especially near New Plymouth. (Cape Colony.)

UMBELLIFERÆ.

- Conium maculatum*, Linn. Sp. Plant. 243; Hook. f. Student's Fl. 167. *Hemlock*. North and South Islands: Waste places, local. (Europe; North and West Asia; North Africa.)
- Bupleurum rotundifolium*, Linn. Sp. Plant. 236; Hook. f. Student's Fl. 168. *Hare's-ear*. North Island: Cultivated fields and waste places. Near Auckland, *T. F. C.*; Wellington, *Kirk!* (Europe; West Asia to the Caucasus.)
- Apium graveolens*, Linn. Sp. Plant. 264; Hook. f. Student's Fl. 169. *Celery*. North and South Islands: Has established itself in several districts in marshy places near the sea. (Europe; West Asia; India; North Africa.)
- Apium leptophyllum*, F. Muell. ex Benth. Fl. Austral. iii. 372. North Island: Waste places from Mongonui to Wellington, not common. (South America; tropical Africa; Australia.)
- Ammi majus*, Linn. Sp. Plant. 243. North Island: Waste places near Auckland, rare. (Europe; West Asia; North Africa.)
- Carum Carui*, Linn. Sp. Plant. 263; Hook. f. Student's Fl. 171. *Caraway*. South Island: Near Dunedin, rare, *A. Hamilton*. (Europe; North and West Asia; India.)
- Carum Petroselinum*, Benth. and Hook. Gen. Plant. i. 891; Hook. f. Student's Fl. 171. *Common Parsley*. North and South Islands: Waste places and roadsides, not uncommon. (South Europe; North Africa.)
- Scandix Pecten-Veneris*, Linn. Sp. Plant. 256; Hook. f. Student's Fl. 175. *Venus's Comb*. North and South Islands: Waste places, far from common. (Europe; West Asia to India; North Africa.)
- Fœniculum vulgare*, Mill. Gard. Dict. ed. viii. n. 1; F. officinale, All.; Hook. f. Student's Fl. 177. *Fennel*. North and South Islands: Waste places and roadsides, abundant. (Europe; North and West Asia to India; North Africa.)
- Peucedanum sativum*, Benth. and Hook. f. Gen. Plant. i. 920; Hook. f. Student's Fl. 193. *Parsnip*. North and South Islands: An occasional escape from cultivation, but not common. (Europe; North Asia.)

- Daucus Carota*, Linn. Sp. Plant. 242; Hook. f. Student's Fl. 184. *Wild Carrot*. North and South Islands: Fields and roadsides, not uncommon. (Europe; North and West Asia to India; North Africa.)
- Caucalis nodosa*, Scop. Fl. Carn. i. 192; Hook. f. Student's Fl. 186. North and South Islands: Waste places, not abundant. (Europe; West Asia to India; North Africa.)

ARALIACEÆ.

- Hedera Helix*, Linn. Sp. Plant. 202; Hook. f. Student's Fl. 187. *Ivy*. North Island: Occasionally spreading in gardens and plantations, but scarcely naturalised. (Europe; West Asia to India; China and Japan; North Africa.)

CAPRIFOLIACEÆ.

- Sambucus nigra*, Linn. Sp. Plant. 269; Hook. f. Student's Fl. 189. *Elder*. North and South Islands: A frequent garden escape, sometimes forming thickets. (Europe; West Asia; North Africa.)
- Leycesteria formosa*, Wall. in Roxb. Fl. Ind. ii. 181; Hook. f. Fl. Brit. Ind. iii. 16. North and South Islands: An occasional garden escape. (Temperate Himalayas.)

RUBIACEÆ.

- Galium palustre*, Linn. Sp. Plant. 105; Hook. f. Student's Fl. 193. North Island: Swamps near Mauku (Manukau Harbour), *H. Carse!* (Europe; North and West Asia; North Africa.)
- Galium Mollugo*, Linn. Sp. Plant. 107; Hook. f. Student's Fl. 194. North Island: Between the Manukau Harbour and the Waikato River, *H. Carse!* (Europe; North and West Asia to the Himalayas; North Africa.)
- Galium Aparine*, Linn. Sp. Plant. 108; Hook. f. Student's Fl. 194. *Goose-grass*. North and South Islands: Hedges and waste places, not uncommon. (Europe; North and West and Central Asia; North Africa.)
- Galium parisiense*, Linn. Sp. Plant. 108; *G. anglicum*, Huds.; Hook. f. Student's Fl. 195. North and South Islands: Local. Whangarei, *Kirk*; vicinity of Auckland, *T. F. C.*; Motueka, *Kingsley*. (South Europe; West Asia to the Caucasus; North Africa.)
- Sherardia arvensis*, Linn. Sp. Plant. 102; Hook. f. Student's Fl. 195. *Field Maider*. North and South Islands: Fields and waste places, abundant throughout. (Europe; West Asia to Persia; North Africa.)

VALERIANEÆ.

- Centranthus ruber*, D.C. Fl. Fr. iv. 239; Hook. f. Student's Fl. 197. *Spur-valerian*. North and South Islands: A frequent garden escape. (South Europe; West Asia; North Africa.)
- Valerianella olitoria*, Pollich, Hist. Pl. Palat. i. 30; Hook. f. Student's Fl. 197. *Lamb's Lettuce*. North Island: Roadsides and waste places, not uncommon. (Europe; West Asia; North Africa.)

DIPSACEÆ.

- Dipsacus sylvestris*, Mill. Gard. Dict. ed. viii. n. 1; Hook. f. Student's Fl. 199. *Wild Teasel*. North Island: Waste places, not common. (Europe; West Asia; North Africa.)
- Scabiosa arvensis*, Linn. Sp. Plant. 99; Hook. f. Student's Fl. 200. *Field Scabious*. North Island: Fields near Auckland, rare. (Europe; North and West Asia; North Africa.)
- Scabiosa maritima*, Linn. Cent. Plant. ii. 8. North Island: A common garden escape; Mongonui, Bay of Islands, Auckland, Tauranga, &c., *T. F. C.*; Wellington, *Kirk!* (South Europe; North Africa.)

COMPOSITÆ.

- Lagenophora emphyysopus*, Hook. f. Fl. Tasm. i. 189; Benth. Fl. Austral. iii. 508. North and South Islands: Hills near Wellington, *Buchanan! Kirk! Banks Peninsula, Kirk!* (Australia.)
- Bellis perennis*, Linn. Sp. Plant. 886; Hook. f. Student's Fl. 205. *Daisy*. North and South Islands, Stewart Island: Abundant in meadows throughout. (Europe; Asia Minor.)
- Calotis lappulacea*, Benth. in Enum. Pl. Hueg. 60; Fl. Austral. iii. 504; *Glossogyne Henneayi*, R. Brown in Trans. N.Z. Inst. xv. (1883) 259. North and South Islands: Poverty Bay, *Bishop Williams! Nelson, Kingsley; Banks Peninsula, Brown! Kirk!* (Australia.)
- Aster imbricatus*, Linn. Pl. Rar. Afr. 21; Harv. and Sond. Fl. Cap. iii. 77. North Island: Ballast at Wellington, *Kirk!* (Cape Colony.)
- Erigeron canadensis*, Linn. Sp. Plant. 863; Hook. f. Student's Fl. 205. *Canadian Flea-bane*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Originally from North America; now almost cosmopolitan.)
- Erigeron linifolius*, Willd. Sp. Plant. iii. 1955; Benth. Fl. Austral. iii. 495. Kermadec Islands, North and South Islands: Abundant in the Auckland Provincial District, rarer southwards to Marlborough and Westport. (Tropics of both hemispheres.)
- Vittadinia australis*, A. Rich.; var. *dissecta*, Benth. Fl. Austral. iii. 491. South Island: Naturalised in several localities, especially about Nelson. In my opinion, this is totally distinct from the typical *V. australis*. (Australia.)
- Stuartina Muelleri*, Sond. in Linnæa, xxv. (1852) 522; Benth. Fl. Austral. iii. 657. South Island: Marlborough, sandy places near the mouth of the Awatere River, *J. H. Macmahon!* (Australia.)
- Helichrysum cymosum*, Less. Syn. Comp. 302; Harv. and Sond. Fl. Cap. iii. 245. South Island: Railway embankments near Westport, *Townson!* (Cape Colony.)
- Gnaphalium purpureum*, Linn. Sp. Plant. 854; Benth. Fl. Austral. iii. 655. North Island: Not uncommon in drained swamps, freshly cleared lands, &c., from the North Cape to the Upper Waikato, rarer southwards to Wellington. (North America; but now naturalised in many parts of the world.)
- Xanthium strumarium*, Linn. Sp. Plant. 987; Benth. Ill. Handb. Brit. Fl. i. 456. *Burweed*. North Island: Roadsides and waste places in Hawke's Bay and Wellington, scarce. (Europe; Central Asia.)
- Xanthium spinosum*, Linn. Sp. Plant. 987; Benth. Fl. Austral. iii. 535. *Bathurst Burr*. North Island: Not uncommon in warm rich soils from the North Cape to the Upper Waikato, rarer southwards to Wellington. (Originally from South America; now naturalised in most warm countries.)
- Pascalina glauca*, Orteg. Hort. Matr. Dec. 39; D.C. Prodr. v. 549. North Island: Ballast at Wellington, *Kirk*. (Chili.)
- Galinsoga parviflora*, Cav. Ic. iii. 41, t. 281; Hook. f. Student's Fl. 211. North Island: Ballast at Wellington, *Kirk*. (South America.)
- Madia sativa*, Molina, Sagg. Chile, ed. i. 136; Wats. Bot. Calif. i. 359. *Tarweed*. South Island: Roadsides and waste places. Renwicktown (Marlborough), *Reader*; south-east Otago, *Petrie! Kirk!* (California; Peru; Chili.)
- Helenium quadridentatum*, Labill. in Act. Soc. Hist. Nat. Par. i. (1792) 22; D.C. Prodr. v. 666. North Island: Waste places at Tapotopoto Bay, North Cape district, *T. F. C.* (North America.)
- Achillea millefolium*, Linn. Sp. Plant. 899; Hook. f. Student's Fl. 212. *Yarrow*. North and South Islands: Fields and roadsides, not uncommon. (Europe; North and West Asia to India; North America.)
- Achillea tanacetifolia*, All. Fl. Pedem. i. 183; D.C. Prodr. vi. 25. North and

- South Islands: Roadsides and waste places, not common. Vicinity of Auckland, *T. F. C.*; Lincoln (near Christchurch), *Kirk.* (South Europe.)
- Anthemis arvensis*, Linn. Sp. Plant. 894; Hook. f. Student's Fl. 211. *Corn Chamomile*. North and South Islands: Roadsides and margins of fields, not uncommon. (Europe; West Asia; North Africa.)
- Anthemis Cotula*, Linn. Sp. Plant. 894; Hook. f. Student's Fl. 212. *Stinking Mayweed*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to India; Canary Islands.)
- Anthemis nobilis*, Linn. Sp. Plant. 894; Hook. f. Student's Fl. 212. *Chamomile*. North and South Islands: An occasional garden escape, rare. (Europe; North Africa.)
- Chrysanthemum segetum*, Linn. Sp. Plant. 889; Hook. f. Student's Fl. 214. *Corn Marigold*. North and South Islands: Cultivated fields, not common. (Europe; West Asia; North Africa.)
- Chrysanthemum Parthenium*, Bernh. Syst. Verz. Erf. 145; Hook. f. Student's Fl. 214. *Fever-few*. North and South Islands: Waste places and roadsides. (Europe.)
- Chrysanthemum Leucanthemum*, Linn. Sp. Plant. 888; Hook. f. Student's Fl. 214. *Ox-eye Daisy*. North and South Islands: An abundant weed in pastures throughout. (Europe; North and West Asia.)
- Matricaria discoidea*, D.C. Prodr. vi. 50; Asa Gray, Man. 226. North Island: Roadsides in the Auckland Provincial District, abundant. (North America.)
- Matricaria Chamomilla*, Linn. Sp. Plant. 891; Hook. f. Student's Fl. 213. *Wild Chamomile*. North and South Islands: Waste places and cultivated fields, not uncommon. (Europe; North and West Asia.)
- Matricaria inodora*, Linn. Fl. Suec. ii. 765; Hook. f. Student's Fl. 213. North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia.)
- Cenia turbinata*, Pers. Syn. ii. 465; Harv. and Sond. Fl. Cap. iii. 185. North Island: Ballast at Wellington, *Kirk.* (Cape Colony.)
- Soliva anthemifolia*, R. Br. in Trans. Linn. Soc. xii. (1817) 102; Benth. Fl. Austral. iii. 552. North Island: Alluvial flats by the Northern Wairoa River, *T. F. C.*; Fairburn's (near Mongontui), *H. Carse!* (South America; naturalised in Australia.)
- Soliva sessilis*, Ruiz and Pav. Prodr. 113, t. 24; D.C. Prodr. vi. 143. North Island: Waste places in the Lower and Middle Waikato, *T. F. C.* (Chili.)
- Tanacetum vulgare*, Linn. Sp. Plant. 844; Hook. f. Student's Fl. 215. *Tansy*. North and South Islands: Waste places, not common. (Europe; North Asia.)
- Artemisia Absinthium*, Linn. Sp. Plant. 848; Hook. f. Student's Fl. 216. *Wormwood*. North and South Islands: Waste places and roadsides, not uncommon. (Europe; North and West Asia; North Africa.)
- Senecio vulgaris*, Linn. Sp. Plant. 867; Hook. f. Student's Fl. 218. *Groundsel*. Kermadec Islands, North and South Islands, Stewart Island: A common weed throughout. (Europe; North Asia; North Africa; and naturalised in all temperate countries.)
- Senecio sylvaticus*, Linn. Sp. Plant. 868; Hook. f. Student's Fl. 218. *S. areolatus*, Col. in Trans. N.Z. Inst. xxvi. (1894) 317. North and South Islands: Abundant throughout. (Europe; North Asia.)
- Senecio Jacobæa*, Linn. Sp. Plant. 870; Hook. f. Student's Fl. 218; *S. dimorphocarpus*, Col. in Trans. N.Z. Inst. xxvi. (1894) 316. *Ragwort*. North and South Islands: Plentiful in many localities. (Europe; North and West Asia.)
- Senecio aquaticus*, Hill, Veg. Syst. ii. 120; Hook. f. Student's Fl. 219. South Island: Buller Valley, *Rev. F. H. Spencer.* (Europe; North Asia; North Africa.)
- Senecio mikanioides*, Otto ex Walp. in Otto and Dietr. Allg. Gartens, xiii. (1845)

- 42; Harv. and Sond. Fl. Cap. iii. 402. North Island: A common garden escape from Kaitaia and Mongonui to Wellington. (South Africa.)
- Calendula officinalis*, Linn. Sp. Plant. 921; D.C. Prodr. vi. 451. *Marigold*. North and South Islands: A frequent garden escape. (South Europe; West Asia.)
- Osteospermum moniliferum*, Linn. Sp. Plant. 923; Harv. and Sond. Fl. Cap. iii. 436. North Island: An occasional garden escape in the vicinity of Auckland, rare. (South Africa.)
- Cryptostemma calendulaceum*, R. Br. in Ait. Hort. Kew. ed. ii. 141; Harv. and Sond. Fl. Cap. iii. 467. *Cape-weed*. North Island: Pastures and waste places, abundant. (Cape Colony.)
- Arctium Lappa*, Linn. Sp. Plant. 816; Hook. f. Student's Fl. 220. *Burdock*. North and South Islands: Waste places from the East Cape southwards, not uncommon. (Europe; North and West Asia.)
- Carduus nutans*, Linn. Sp. Plant. 821; Hook. f. Student's Fl. 224. *Musk-thistle*. South Island: Eastern Otago, *Kirk*. (Europe; North and West Asia to India; North Africa.)
- Carduus pycnocephalus*, Linn. Sp. Plant. ed. ii. 1151; Hook. f. Student's Fl. 225. *Slender Thistle*. North and South Island: Not uncommon in fields and waste places. (Europe; North Africa.)
- Cnicus lanceolatus*, Willd. Prodr. Fl. Berl. 259; Hook. f. Student's Fl. 225. *Spear Thistle*. North and South Islands, Stewart Island: Abundant throughout. (Europe; North Asia; North Africa.)
- Cnicus eriophorus*, Roth. Tent. Fl. Germ. i. 345; Hook. f. Student's Fl. 225. *Woolly Thistle*. North Island: Upper Wairarapa, *Kirk*. (Europe.)
- Cnicus arvensis*, Hoffm. Deutschl. Fl. ed. ii. 130; Hook. f. Student's Fl. 226. *Californian Thistle*; *Canadian Thistle*. North and South Islands: Cultivated fields; a serious pest in many localities. (Europe; North and West Asia; North Africa.)
- Onopordon Acanthium*, Linn. Sp. Plant. 827; Hook. f. Student's Fl. 227. *Cotton Thistle*. South Island: Ashburton, *W. W. Smith*. (Europe; North Asia.)
- Silybum Marianum*, Gaertn. Fruct. ii. 378, t. 168; Hook. f. Student's Fl. 228. *Milk Thistle*. North and South Islands: Fields and waste places, abundant to the north of the East Cape, rarer southwards. (Europe; West Asia to the Caucasus.)
- Cynara Cardunculus*, Linn. Sp. Plant. 827; D.C. Prodr. vi. 620. *Cardoon*. North Island: Waste places, not common. Mongonui, *T. F. C.*; Napier, *Kirk*. (South Europe.)
- Centaurea nigra*, Linn. Sp. Plant. 911; Hook. f. Student's Fl. 222. *Knap-weed*. North and South Islands: Fields and waste places, not common. (Europe.)
- Centaurea cyanus*, Linn. Sp. Plant. 911; Hook. f. Student's Fl. 222. *Cornflower*. South Island: Ashburton, *W. W. Smith*. (Europe; West Asia to India.)
- Centaurea Calcitrapa*, Linn. Sp. Plant. 917; Hook. f. Student's Fl. 223. *Star-thistle*. North and South Islands: Fields and waste places, not uncommon. (Europe; West Asia to India.)
- Centaurea solstitialis*, Linn. Sp. Plant. 917; Hook. f. Student's Fl. 223. *Yellow Star-thistle*. North and South Islands: Fields and waste places, not uncommon. (Europe; West Asia; North Africa.)
- Cichorium Intybus*, Linn. Sp. Plant. 813; Hook. f. Student's Fl. 228. *Chicory*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to India; North Africa.)
- Tolpis umbellata*, Bertol. in Mem. Soc. Emul. Genova, ii. (1803) 133; D.C. Prodr. vii. 86. North Island: Fields between Panmure and Penrose (Auckland District), near Helensville, *T. F. C.* (South Europe.)
- Lapsana communis*, Linn. Sp. Plant. 811; Hook. f. Student's Fl. 229. *Nipplewort*. North and South Islands, Stewart Island: Waste places and culti-

- vated fields, abundant. (Europe; North and West Asia to India; North Africa.)
- Picris (Helminthia) echinoides*, Linn. Sp. Plant. 792; Hook. f. Student's Fl. 230. *Ox-tongue*. North and South Islands: Fields and waste places, generally distributed. (Europe; North Africa.)
- Crepis virens*, Linn. Sp. Plant. 1134; Hook. f. Student's Fl. 230. North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, common throughout. (Europe; Caucasus; North Africa.)
- Crepis foetida*, Linn. Sp. Plant. 807; Hook. f. Student's Fl. 231. North Island: Fields on the Auckland Isthmus, not common. (Europe; West Asia to the Himalayas; North Africa.)
- Crepis taraxacifolia*, Thuill. Fl. Par. 409; Hook. f. Student's Fl. 231. North Island: Fields and waste places in the Auckland District. (Europe; West Asia; North Africa.)
- Crepis setosa*, Hall. f. in Roem. Archiv. i. 2, 1; Hook. f. Student's Fl. 231. North Island: Waste places on the Auckland Isthmus, not common. (Europe.)
- Hypochaeris glabra*, Linn. Sp. Plant. 810; Hook. f. Student's Fl. 238. *Smooth Cat's-ear*. North and South Islands: Fields, &c., abundant throughout. (Europe; West Asia; North Africa.)
- Hypochaeris radicata*, Linn. Sp. Plant. 810; Hook. f. Student's Fl. 238. *Cat's-ear*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant in all soils and situations. (Europe; North Africa.)
- Leontodon hirtus*, Linn. Syst. 1194; Hook. f. Student's Fl. 239. *Lesser Hawkbit*. North and South Islands: Fields and waste places, not common. (Europe.)
- Leontodon hispidus*, Linn. Sp. Plant. 799; Hook. f. Student's Fl. 239. *Common Hawkbit*. North and South Islands: Fields and waste places, plentiful in many localities. (Europe.)
- Leontodon autumnalis*, Linn. Sp. Plant. 798; Hook. f. Student's Fl. 239. *Autumnal Hawkbit*. North Island: Fields and waste places from Auckland to Wellington, not common. (Europe; North and West Asia.)
- Lactuca saligna*, Linn. Sp. Plant. 796; Hook. f. Student's Fl. 241. *Willow Lettuce*. North Island: Petane (Hawke's Bay), A. Hamilton. (Europe; West Asia; North Africa.)
- Lactuca muralis*, E. Mey. Chlor. Hannov. 431; Hook. f. Student's Fl. 241. *Wall Lettuce*. South Island: Marlborough, Macmahon! Kirk! (Europe; North and West Asia.)
- Sonchus arvensis*, Linn. Sp. Plant. 793; Hook. f. Student's Fl. 242. *Corn Sow-thistle*. North Island: Cultivated fields near Auckland, rare. (Europe; West Asia to the Himalayas; North Africa.)
- Tragopogon porrifolius*, Linn. Sp. Plant. 789; Hook. f. Student's Fl. 243. *Salsify*. North and South Islands: Fields and waste places, not common. (Europe; North and West Asia.)

CAMPANULACEÆ.

- Campanula Trachelium*, Linn. Sp. Plant. 166; Hook. f. Student's Fl. 247. North Island: A garden (scape near Wellington. (Europe; North and West Asia.)
- Specularia hybrida*, A. D.C. Monog. Camp. 348; Hook. f. Student's Fl. 248. South Island: Cultivated fields at Ashburton, W. W. Smith. (Europe; North Africa.)

EPACRIDÆ.

- Epacris purpurascens*, R. Br. Prodr. 550; Benth. Fl. Austral. iv. 241. North Island: Open tea-tree country at the head of the Manukau Harbour, near Papakura and Drury. (Australia.)

Epacris microphylla, R. Br. Prodr. 550; Benth. Fl. Austral. iv. 240. North Island: In the same locality as the preceding species, *A. T. Urquhart!* (Australia.)

Epacris pulchella, Cav. Ic. iv. 26, t. 345; Benth. Fl. Austral. iv. 241. North Island: In the same locality as *E. purpurascens*, *A. T. Urquhart!* (Australia.)

PRIMULACEÆ.

Anagallis arvensis, Linn. Sp. Plant. 148; Hook. f. Student's Fl. 265. *Pimpernel*. North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, abundant. (Europe; West Asia to India; North Africa.)

APOCYNACEÆ.

Vinca major, Linn. Sp. Plant. 209; Hook. f. Student's Fl. 269. *Periwinkle*. North and South Islands: Roadsides and waste places, a plentiful garden escape. (South Europe; West Asia to the Caucasus; North Africa.)

ASCLEPIADEÆ.

Gomphocarpus fruticosus, R. Br. in Mem. Wern. Soc. i. (1809) 38; D.C. Prodr. vii. 557. North Island: An occasional garden escape near Auckland and Napier, rare. (Arabia; North Africa; now naturalised in most warm countries.)

GENTIANEÆ.

Erythræa Centaurium, Pers. Syn. i. 283; Hook. f. Student's Fl. 271. *Centaury*. North and South Islands: Abundant throughout. (Europe; North Africa.)

POLEMONIACEÆ.

Collomia coccinea, Lehm. ex Benth. in Bot. Reg. t. 1622; D.C. Prodr. ix. 308. North and South Islands: A garden escape in a few localities. Vicinity of Auckland, *T. F. C.*; Ashburton, *W. W. Smith*; near Roxburgh, *Petrie!* Cardrona, *Kirk!* (Chili.)

Gilia squarrosa, Hook. and Arn. Bot. Beech. Voy. 151; Wats. Bot. Calif. i. 493. North and South Islands: Dry pastures, not uncommon. (California.)

BORAGINEÆ.

Amsinckia angustifolia, Lehm. Del. Sem. Hort. Hamb. (1831) 7. South Island: Interior of Otago, Alexandra South, Black's, *Petrie!* (Chili.)

Borago officinalis, Linn. Sp. Plant. 137; Hook. f. Student's Fl. 276. *Borage*. North Island: Waste places from Auckland to Wellington, not uncommon. (Europe; North Africa.)

Myosotis palustris, Lam. Fl. Fr. ii. 283; Hook. f. Student's Fl. 280. *Forget-me-not*. North and South Islands: Not uncommon in wet places. (Europe; North Asia.)

Myosotis cæspitosa, Schultz, Prodr. Fl. Starg. Suppl. i. 11; Hook. f. Student's Fl. 281. North and South Islands: Not uncommon in wet places. (Europe; North and West Asia to India.)

Myosotis sylvatica, Hoffm. Deutschl. Fl. ed. i. 61; Hook. f. Student's Fl. 281. North and South Islands: Waste places, not common. (Europe; North and West Asia; North Africa.)

Myosotis arvensis, Lam. Fl. Fr. ii. 213; Hook. f. Student's Fl. 281. North and South Islands: Fields and waste places, local. (Europe; North and West Asia to India; North Africa.)

Myosotis collina, Hoffm. Deutschl. Fl. ed. i. 61; Hook. f. Student's Fl. 282. North and South Islands: Fields and waste places, not common. (Europe; West Asia; North Africa.)

- Lithospermum arvense*, Linn. Sp. Plant. 132; Hook. f. Student's Fl. 279. *Corn Gromwell*. North and South Islands: Fields and waste places, plentiful. (Europe; North and West Asia to India; North Africa.)
- Echium vulgare*, Linn. Sp. Plant. 139; Hook. f. Student's Fl. 276. *Viper's Bugloss*. North and South Islands: Roadsides and waste places, local. (Europe; North Asia; North Africa.)
- Echium plantagineum*, Linn. Mant. ii. 202; Hook. f. Student's Fl. 276. North Island: Waste places, rare. Vicinity of Auckland, T. F. C.; ballast at Wellington, Kirk! (South Europe; North Africa.)

CONVOLVULACEÆ.

- Ipomœa batatas*, Poir. Encycl. vi. 14. *Kumara*. North Island: Introduced by the Maoris from Polynesia, and still largely cultivated by them. It often lingers for some time in deserted plantations. (Native country uncertain; now cultivated in all warm climates.)
- Convolvulus arvensis*, Linn. Sp. Plant. 153; Hook. f. Student's Fl. 284. *Smaller Bindweed*. North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia to India; North Africa.)
- Cuscuta racemosa*, Mart. Reise. Bras. i. 286, var. *Chiliana*, Engelm. Cusc. 505; *C. Hassiaca*, Pfeiff. in Bot. Zeit. i. (1843) 705; Kirk in Trans. N.Z. Inst. xx. (1888) 182. South Island: Fields in the Canterbury Provincial District, parasitic on lucerne, knot-grass, &c. (Chili; from whence it has been carried to North America and Europe.)
- Cuscuta Epilinum*, Weihe, in Archiv. Apoth. viii. (1824) 54; Hook. f. Student's Fl. 285. *Flax Dodder*. South Island: Has been recorded from the Canterbury District, but I have seen no specimens (Europe; East Asia.)
- Cuscuta Epithymum*, Murr. Syst. ed. xiii. 140; Hook. f. Student's Fl. 285. *Lesser Dodder*. North and South Islands: From Auckland to Foveaux Strait, abundant in many places, and parasitic on a great variety of plants, including many indigenous species. Mr. Kirk's *C. novæ zealandiæ* (Trans. N.Z. Inst. xx. (1889) 183, name only) appears to be identical with it. The var. *Trifolii* (*Clover Dodder*), which usually attacks clover, is also introduced. (Europe; North Asia.)

SOLANACEÆ.

- Lycopersicum esculentum*, Mill. Gard. Dict. ed. viii. n. 2; D.C. Prodr. xiii. 26. *Tomato*. North and South Islands: An occasional garden escape of short duration. (Tropical America.)
- Solanum tuberosum*, Linn. Sp. Plant. 185; D.C. Prodr. xiii. 31. *Potato*. North and South Islands: Often lingers for a time in places where it has been cultivated. (South America.)
- Solanum marginatum*, Linn. f. Suppl. 147; D.C. Prodr. xiii. 370. North Island: A garden outcast near Auckland. (Tropical Africa.)
- Solanum sodomœum*, Linn. Sp. Plant. 187; Benth. Fl. Austral. iv. 458. *Dead-sea Apple*. North Island: From the North Cape to the Upper Waikato, on warm dry soils and on sand-dunes, not uncommon. (South Europe; North Africa.)
- Solanum auriculatum*, Ait. Hort. Kew, ed. i. 246; Benth. Fl. Austral. iv. 450. North Island: Waste places in the vicinity of Auckland, increasing. (Tropical America; and widely naturalised in warm countries.)
- Physalis peruviana*, Linn. Sp. Plant. ed. ii. 1670; Benth. Fl. Austral. iv. 466. *Cape Gooseberry*. North Island: An escape from cultivation in warm dry soils, not common. (South America.)
- Nicanandra physaloides*, Gaertn. Fruct. ii. 237; Benth. Fl. Austral. iv. 465. North Island: Waste places in the vicinity of Auckland, scarce. (Peru.)
- Lycium chinense*, Mill. Gard. Dict. ed. viii. n. 5; Benth. Fl. Austral. iv. 467. North and South Islands: Waste places and roadsides, not uncommon. (China.)

- Datura Stramonium*, Linn. Sp. Plant. 179; Benth. Ill. Handb. Brit. Fl. 592. *Thorn-apple*. North and South Islands: Waste places in rich warm soils as far south as Canterbury, not uncommon. (Native or naturalised in most warm countries.)
- Hyoscyamus niger*, Linn. Sp. Plant. 179; Hook. f. Student's Fl. 286. *Henbane*. North Island: Ballast at Wellington, *Kirk!* (Europe; North and West Asia to India.)
- Nicotiana Tabacum*, Linn. Sp. Plant. 180; D.C. Prodr. xiii. 557. *Tobacco*. North Island: An occasional escape from cultivation in rich warm soils. (Indigenous in America; now cultivated in all warm countries.)
- Nicotiana acutiflora*, A. St. Hil. Pl. Rem. Bras. 209. North Island: Ballast at Wellington, *Kirk!* (Brazil.)
- Petunia parviflora*, Juss. in Ann. Mus. Par. ii. (1803) 216, t. 47; Asa Gray, Syn. Fl. North Amer. ii. 243. North Island: Ballast at Wellington, *Kirk!* (Southern United States to Buenos Ayres.)

SCROPHULARINEÆ.

- Verbascum Thapsus*, Linn. Sp. Plant. 177; Hook. f. Student's Fl. 291. *Mullein*. North and South Islands: Abundantly naturalised in dry places. (Europe; North and West Asia to the Himalayas.)
- Verbascum Blattaria*, Linn. Sp. Plant. 178; Hook. f. Student's Fl. 292. *Moth Mullein*. North and South Islands: Pastures and waste places, not uncommon. (Europe; North Asia.)
- Celsia cretica*, Linn. f. Suppl. 281; Benth. in D.C. Prodr. x. 244. North Island: Fields in the Auckland District, not uncommon. (South Europe; North Africa.)
- Linaria vulgaris*, Mill. Gard. Dict. ed. viii. n. 1; Hook. f. Student's Fl. 294. *Toad flax*. South Island: Near Lake Brunner, *J. W. Brame!* Ashburton, *W. W. Smith.* (Europe; North Asia.)
- Linaria purpurea*, Mill. Gard. Dict. ed. viii. n. 5; Benth. in D.C. Prodr. x. 278. South Island: A garden escape in some parts of Canterbury and Otago. (South Europe.)
- Linaria latifolia*, Desf. Fl. Atlant. ii. 40, t. 134; Benth. in D.C. Prodr. x. 271. North Island: A garden escape in the vicinity of Wellington, *Kirk!* (South Europe; North Africa.)
- Linaria Elatine*, Mill. Gard. Dict. ed. viii. n. 16; Hook. f. Student's Fl. 293. North and South Islands: Roadsides and waste places, not uncommon. (Europe; West and Central Asia.)
- Linaria Cymbalaria*, Mill. Gard. Dict. ed. viii. n. 17; Hook. f. Student's Fl. 293. North and South Islands: An occasional garden escape. (South Europe.)
- Antirrhinum Orontium*, Linn. Sp. Plant. 617; Hook. f. Student's Fl. 295. North Island: Waste places near Auckland, *T. F. C.*; Napier, *A. Hamilton!* (Europe; West Asia to India; North Africa.)
- Mimulus luteus*, Linn. Sp. Plant. ed. ii. 884; Asa Gray, Syn. Fl. North Amer. ii. 277. North and South Islands: Damp places, sides of streams, &c., from Wellington southwards. (Western North America.)
- Mimulus moschatus*, Dougl. in Lindl. Bot. Reg. t. 1118; Asa Gray, Syn. Fl. North Amer. ii. 278. North and South Islands: Sides of streams from Wellington southwards, common. (Western North America.)
- Digitalis purpurea*, Linn. Sp. Plant. 621; Hook. f. Student's Fl. 298. *Foxglove*. North and South Islands: An occasional garden escape, not common. (Europe.)
- Veronica agrestis*, Linn. Sp. Plant. 13; Hook. f. Student's Fl. 299. Kermadec Islands, North and South Islands: Fields and waste places, abundant. (Europe; North and West Asia to the Himalayas; North Africa.)
- Veronica Buxbaumii*, Ten. Fl. Nap. i. 7, t. 1; Hook. f. Student's Fl. 299; *V. areolata*, Col. in Trans. N.Z. Inst. xxiv. (1892) 392. North and South

Islands: Cultivated fields, abundant. (Europe; West Asia to the Himalayas; North Africa.)

Veronica arvensis, Linn. Sp. Plant. 13; Hook. f. Student's Fl. 300; *V. longercemosa*, Col. in Trans. N.Z. Inst. xx. (1888) 203, and *V. hirsuta*, Col. l.c. xxiv. (1892) 393. Kermadec Islands, North and South Islands, Stewart Island: Fields and waste places, abundant throughout. (Europe; North and West Asia to India; North Africa.)

Veronica serpyllifolia, Linn. Sp. Plant. 12; Hook. f. Student's Fl. 300; *V. macrocalyx* and *V. rugulosella*, Col. in Trans. N.Z. Inst. xxiv. (1892) 391; *V. oligantha*, Col. l.c. xxv. (1893) 333. North and South Islands Stewart Island: Fields and waste places, abundant throughout. (Europe; North and West Asia to the Himalayas; North America.)

Veronica officinalis, Linn. Sp. Plant. 11; Hook. f. Student's Fl. 301. South Island: Has been recorded from the Canterbury District by *Armstrong* and *W. W. Smith*, but I have seen no specimens. (Europe; North and West Asia to the Himalayas; North America.)

Bartsia viscosa, Linn. Sp. Plant. 602; Hook. f. Student's Fl. 303. North and South Islands: Abundant in fields in most districts. (Europe; West Asia; North Africa.)

OROBANCHEÆ.

Orobanche minor, Sutt. in Trans. Linn. Soc. iv. (1798) 179; Hook. f. Student's Fl. 309. *Broom-rape*. North and South Islands: Fields as far south as Nelson, most abundant in the Auckland District; parasitic on *Trifolium*, *Medicago*, *Hypochaeris*, &c. (Europe; West Asia; North Africa.)

VERBENACEÆ.

Verbena officinalis, Linn. Sp. Plant. 20; Hook. f. Student's Fl. 313. *Vervain*. North and South Islands: Fields and roadsides, not uncommon. (Europe; West Asia to India; North Africa.)

Verbena bonariensis, Linn. Sp. Plant. 20; Benth. Fl. Austral. v. 36. North Island: Waste places near Auckland, rare. (Extratropical South America.)

LABIATÆ.

Mentha viridis, Linn. Sp. Plant. ed. ii. 804; Hook. f. Student's Fl. 315. *Spearmint*. North and South Islands: Waste places, ditches, &c., not uncommon. (Europe; North Asia; North Africa.)

Mentha piperita, Linn. Sp. Plant. 576; Hook. f. Student's Fl. 316. *Peppermint*. North and South Islands: An occasional garden escape in damp places. (Europe.)

Mentha aquatica, Linn. Sp. Plant. 576; Hook. f. Student's Fl. 316. *Watermint*. North Island: Wet places in the Auckland District, not common. (Europe; North and West Asia; North Africa.)

Mentha arvensis, Linn. Sp. Plant. 577; Hook. f. Student's Fl. 317. North Island: Fields and waste places, not uncommon. (Europe; North and West Asia to China and India.)

Mentha australis, R. Br. Prodr. 505; Benth. Fl. Austral. v. 83. North Island: Raglan, *T. F. C.*; Wairarapa, *Kirk*! (Australia.)

Mentha pulegium, Linn. Sp. Plant. 577; Hook. f. Student's Fl. 318. *Pennyroyal*. North and South Islands: Fields and waste places, an abundant weed, especially in the Auckland District. (Europe; North and West Asia North Africa.)

Thymus Serpyllum, Linn. Sp. Plant. 590; Hook. f. Student's Fl. 319. *Thyme*. North and South Islands: An occasional garden escape, not common. (Europe; North and West Asia to the Himalayas; North Africa.)

Melissa officinalis, Linn. Sp. Plant. 592; Hook. f. Student's Fl. 321. *Balm*. North and South Islands: A garden escape in a few localities. (South Europe; West Asia.)

Salvia Verbenaca, Linn. Sp. Plant. 25; Hook. f. Student's Fl. 321. *Wild Sage*. North Island: Waste places near Auckland, *Kirk*! *T. F. C.*

- Nepeta Cataria*, Linn. Sp. Plant. 570; Hook. f. Student's Fl. 322. *Catmint*. North Island: Waste places and roadsides in the Auckland Provincial District, not common. (Europe; North and West Asia to the Himalayas.)
- Nepeta Glechoma*, Benth. Lab. Gen. et Sp. 485; Hook. f. Student's Fl. 323. *Ground Ivy*. North Island: Vicinity of Wanganui, *Kirk*. (Europe; North and West Asia.)
- Cedronella triphylla*, Moench, Meth. 411; Benth. in D.C. Prodr. xii. 406. North Island: Waste places near Auckland, *T. F. C.*; near Wellington, *Kirk*! (Canary Islands.)
- Prunella vulgaris*, Linn. Sp. Plant. 600; Hook. f. Student's Fl. 323. *Self-heal*. North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa; North America.)
- Marrubium vulgare*, Linn. Sp. Plant. 583; Hook. f. Student's Fl. 325. *Horehound*. North and South Islands: Roadsides and waste places, abundant. (Europe; West Asia to India; North Africa.)
- Stachys germanica*, Linn. Sp. Plant. 581; Hook. f. Student's Fl. 326. *Woundwort*. South Island: Vicinity of Ashburton, *W. W. Smith*. (Europe; West Asia.)
- Stachys palustris*, Linn. Sp. Plant. 580; Hook. f. Student's Fl. 325. North Island: Near Wanganui, *Kirk*. (Europe; North and West Asia to India; North America.)
- Stachys arvensis*, Linn. Sp. Plant. ed. ii. 814; Hook. f. Student's Fl. 326. North Island: Cultivated fields, an abundant weed. (Europe; North and West Asia; North Africa.)
- Stachys annua*, Linn. Sp. Plant. ed. ii. 813; Benth. in D.C. Prodr. xii. 481. South Island: Vicinity of Ashburton, *W. W. Smith*. (Europe; West Asia to the Caucasus.)
- Galeopsis Tetrachit*, Linn. Sp. Plant. 579; Hook. f. Student's Fl. 327. *Hemp-nettle*. North Island: Waste places in the vicinity of Auckland, rare. (Europe; North and West Asia to India.)
- Lamium purpureum*, Linn. Sp. Plant. 579; Hook. f. Student's Fl. 328. *Dead-nettle*. North and South Islands: Cultivated ground at Wanganui, *Kirk*; Ashburton, *W. W. Smith*. (Europe; North and West Asia; North Africa.)

PLANTAGINÆ.

- Plantago major*, Linn. Sp. Plant. 112; Hook. f. Student's Fl. 288. *Greater Plantain*. North and South Islands, Stewart Island, Chatham Islands: Roadsides and waste places, abundant. (Europe; North and West Asia to India; North Africa.)
- Plantago media*, Linn. Sp. Plant. 113; Hook. f. Student's Fl. 289. North and South Islands: Fields and waste places, not common. (Europe; West Asia.)
- Plantago lanceolata*, Linn. Sp. Plant. 113; Hook. f. Student's Fl. 289. *Ribwort*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; and now naturalised in almost all parts of the world.)
- Plantago varia*, R. Br. Prodr. 424; Benth. Fl. Austral. v. 139. North and South Islands: Sparingly naturalised in several localities between the East Cape and Banks Peninsula. (Australia.)
- Plantago hirtella*, H. B. and K. Nov. Gen. et Sp. ii. 229; Asa Gray, Syn. Fl. North Amer. ii. 392. North Island: Moist shaded places, not uncommon. (California; Mexico; Chili.)
- Plantago Coronopus*, Linn. Sp. Plant. 115; Hook. f. Student's Fl. 289. North and South Islands: Sandy and gravelly places, not uncommon. (Europe; West Asia; North Africa.)

NYCTAGINEÆ.

- Mirabilis Jalapa*, Linn. Sp. Plant. 177; Chois. in D.C. Prodr. xiii. 2, 429. *Marvel of Peru*. North Island: An occasional garden escape near Auckland. (Tropical America.)

ILLECEBRACEÆ.

- Herniaria hirsuta*, Linn. Sp. Plant. 218; Hook. f. Student's Fl. 334. *Rupturewort*. North Island: Sandy flats north of the Manukau Heads, T. F. C. (Europe; West Asia to India.)

AMARANTACEÆ.

- Amarantus caudatus*, Linn. Sp. Plant. 990; Moq. in D.C. Prodr. xiii. 2, 255. North Island: A garden escape in the vicinity of Auckland, not common. (Most warm countries.)
- Amarantus retroflexus*, Linn. Sp. Plant. 991; Asa Gray, Man. 368. North Island: Waste places and gardens, not uncommon. South Island: Nelson, T. F. C. (Tropical America; and naturalised in most warm climates.)
- Amarantus hybridus*, Linn. Sp. Plant. 990; Asa Gray, Man. 368. North Island: Waste places and gardens, common to the north of the East Cape. (Tropical America.)
- Amarantus Blitum*, Linn. Sp. Plant. 990; Moq. in D.C. Prodr. xiii. 2, 263. North and South Islands: Roadsides and waste places, not uncommon as far south as Nelson and Westport. (Most temperate and warm regions.)
- Amarantus viridis*, Linn. Sp. Plant. ed. ii. 1405; Benth. Fl. Austral. v. 215. North Island: Waste places and gardens, not uncommon as far south as Wellington. (Most warm regions.)
- Teleanthera* sp. North Island: Ballast at Aratapu, by the Northern Wairoa River. I have failed to precisely identify this, which is probably an introduction from South America.

CHENOPODIACEÆ.

- Chenopodium album*, Linn. Sp. Plant. 219; Hook. f. Student's Fl. 336. *Fat-hen*. North and South Islands: Waste places and cultivated fields, an abundant weed. (Europe; North and West Asia to India.)
- Chenopodium ficifolium*, Smith Fl. Brit. i. 276; Hook. f. Student's Fl. 337. North Island: Ballast at Wellington, *Kirk!* (Europe.)
- Chenopodium murale*, Linn. Sp. Plant. 219; Hook. f. Student's Fl. 337. North Island: Waste places and roadsides, abundant. (Europe; West Asia to India; North Africa.)
- Chenopodium Bonus-Henricus*, Linn. Sp. Plant. 218; Hook. f. Student's Fl. 338. North Island: An occasional escape from cultivation. (Europe; North Asia.)
- Roubieva multifida*, Moq. in Ann. Sci. Nat. Ser. ii. (1834) 292; D.C. Prodr. xiii. 2, 80. North Island: Ballast at Wellington, *Kirk!*
- Beta vulgaris*, Linn. Sp. Plant. 222. *Beet*. North Island: An occasional escape from cultivation. (Europe; North and West Asia.)

PHYTOLACCACEÆ.

- Phytolacca octandra*, Linn. Sp. Plant. ed. ii. 631; Benth. Fl. Austral. v. 14 *Ink-plant; Poke-weed*. North Island: Roadsides and waste places, abundant in the Auckland District. (Tropical America.)

POLYGONACEÆ.

- Polygonum lapathifolium*, Linn. Sp. Plant. 360; Hook. f. Student's Fl. 344. South Island: Ashburton, W. W. Smith. I have not seen New Zealand specimens. (Europe; North and West Asia to India; North Africa.)

- Polygonum Persicaria*, Linn. Sp. Plant. 361; Hook. f. Student's Fl. 345. North and South Islands: Ditches and roadsides, not common. (Europe; North and West Asia to India; North Africa.)
- Polygonum Hydropiper*, Linn. Sp. Plant. 361; Hook. f. Student's Fl. 345. *Water-pepper*. North Island: East Cape district, *Bishop Williams*! (Europe; North and West Asia to India and Java; North America.)
- Polygonum Convolvulus*, Linn. Sp. Plant. 364; Hook. f. Student's Fl. 347. *Black Bindweed*. North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia to the Himalayas; North Africa.)
- Fagopyrum esculentum*, Moench, Meth. 290; Hook. f. Fl. Brit. India, v. 55. *Buckwheat*. North and South Islands: An escape from cultivation. (North and Central Asia; now cultivated in most parts of the world.)
- Rumex obtusifolius*, Linn. Sp. Plant. 335; Hook. f. Student's Fl. 347. *Common Dock*. North and South Islands, Stewart Island, Chatham Islands: Plentiful throughout. (Europe; North and West Asia; North Africa.)
- Rumex pulcher*, Linn. Sp. Plant. 336; Hook. f. Student's Fl. 348. *Fiddle Dock*. North and South Islands: Fields and waste places, abundant. (Europe; West Asia; North Africa.)
- Rumex palustris*, Smith, Fl. Brit. i. 394; Hook. f. Student's Fl. 349. North Island: Near Wellington, *Buchanan*. (Europe; North Asia.)
- Rumex crispus*, Linn. Sp. Plant. 335; Hook. f. Student's Fl. 349. *Curled Dock*. North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, abundant. (Europe; North Asia; North Africa.)
- Rumex sanguineus*, Linn. Sp. Plant. 334; Hook. f. Student's Fl. 349. North and South Islands, Stewart Island: Fields and waste places, abundant throughout. The form with the veins of the leaves green, not red (*R. viridis*, Sibthorp), is the one most abundant in New Zealand. (Europe; West Asia.)
- Rumex conglomeratus*, Murr. Prodr. Gotting. 52; Hook. f. Student's Fl. 349. North Island: Roadsides and waste places near Auckland and Wellington, not common. (Europe; West Asia; North Africa.)
- Rumex acetosa*, Linn. Sp. Plant. 337; Hook. f. Student's Fl. 350. *Sorrel*. North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia; North Africa.)
- Rumex acetosella*, Linn. Sp. Plant. 338; Hook. f. Student's Fl. 351. *Sheep's Sorrel*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Pastures and cultivated fields, a most abundant and troublesome weed. (Europe; North Asia; North Africa; and introduced elsewhere.)
- Emex australis*, Steinh. in Ann. Sci. Nat. Sér. ii. (1839) 195; Benth. Fl. Austral. v. 262. North and South Islands: Near Auckland and in the Bay of Plenty, *T. F. C.*; vicinity of Wellington, *Kirk*! Westport, *Townson*! (Australia.)

PROTEACEÆ.

- Hakea acicularis*, R. Br. Prodr. 383; Benth. Fl. Austral. v. 54. North Island: Often planted for hedges in the Auckland District, and frequently spreads. (Australia.)

EUPHORBIACEÆ.

- Euphorbia helioscopia*, Linn. Sp. Plant. 459; Hook. f. Student's Fl. 356. *Sun Spurge*. North and South Islands: Roadsides and waste places, not uncommon as far south as Canterbury. (Europe; North and West Asia to India and Japan.)
- Euphorbia Peplus*, Linn. Sp. Plant. 456; Hook. f. Student's Fl. 358. *Milk-weed*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Waste places, gardens, &c., an abundant weed. (Europe; North and West Asia; North Africa.)

- Euphorbia Lathyris*, Linn. Sp. Plant. 457; Hook. f. Student's Fl. 359. *Caper Spurge*. North and South Islands: Waste places in rich warm soils, not common. (South Europe.)
- Euphorbia hypericifolia*, Linn. Sp. Plant. 454; Hook. f. Fl. Brit. Ind. v. 249. North Island: Streets of Auckland, once well established, now nearly extinct. (Tropics of both hemispheres.)
- Euphorbia ovalifolia*, Engelm. ex Klotsche and Garcke in Abh. Akad. Berl. (1860) 26. North Island: Ballast at Wellington, *Kirk!* (Temperate South America.)
- Ricinus communis*, Linn. Sp. Plant. 1007; Muell. Arg. in D.C. Prodr. xv. 2, 1017. *Castor-oil*. North Island: Waste places on warm rich soils from Mongonui to the Waikato River, not common. (All tropical countries.)

URTICACEÆ.

- Humulus Lupulus*, Linn. Sp. Plant. 1028; Hook. f. Student's Fl. 363. *Hop*. North and South Islands: Waste places, hedges, &c., an occasional escape from cultivation. (Europe; North Asia; North America.)
- Ficus Carica*, Linn. Sp. Plant. 1059. *Common Fig*. North Island: Often lingers for a considerable time in deserted orchards, but is scarcely naturalised. (South Europe; West Asia; North Africa.)
- Urtica urens*, Linn. Sp. Plant. 984; Hook. f. Student's Fl. 362. *Small Nettle*. North and South Islands: Waste places, not common. (Europe; North and West Asia; North Africa.)
- Urtica dioica*, Linn. Sp. Plant. 984; Hook. f. Student's Fl. 362. *Common Nettle*. North and South Islands: Roadsides and waste places, not common. (Europe; North and West Asia to India; North Africa.)

SALICINÆÆ.

- Salix fragilis*, Linn. Sp. Plant. 1017; Hook. f. Student's Fl. 371. *Crack Willow*. North and South Islands: Abundantly naturalised on the banks of the larger rivers. (Europe; North and West Asia.)
- Salix babylonica*, Linn. Sp. Plant. 1017; Anderss. in D.C. Prodr. xvi. 2, 212. *Weeping Willow*. North Island: Copiously naturalised on the banks of the Northern Wairoa, Waikato, and other streams. (Europe; North and West Asia.)

HYDROCHARIDÆÆ.

- Elodea canadensis*, Michx. Fl. Bor. Am. i. 20; Hook. f. Student's Fl. 382. *Water-thyme*. North and South Islands: Clear slow-running streams. Near Mongonui; Bay of Plenty; River Avon, and other streams on the Canterbury Plains. (Originally from North America; now copiously naturalised in Europe.)
- Vallisneria spiralis*, Linn. Sp. Plant. 1015; Benth. Fl. Austral. vi. 259. North Island: Abundantly naturalised in Lake Takapuna, near Auckland. See Trans. N.Z. Inst. xxix. 386. (Most tropical countries.)
- Ottelia ovalifolia*, L. Rich. in Mem. Hist. Soc. Par. (1811) 78; Benth. Fl. Austral. vi. 257. North Island: Lakes and ponds in the Auckland District. Ihumatao, T. F. C.; near the mouth of the Waitakerei River and at Tuarau, Professor Thomas. (Australia.)

SCITAMINÆÆ.

- Canna indica*, Linn. Sp. Plant. 1. *Indian-shot*. North Island: An occasional garden escape near Auckland. (Now established in all warm climates.)

IRIDACEÆ.

- Iris germanica*, Linn. Sp. Plant. 38; Hook. Bot. Mag. t. 670. North Island: A frequent garden escape. (Europe.)

- Iris pseud-acorus*, Linn. Sp. Plant. 38; Hook. f. Student's Fl. 397. *Yellow Flag*. North and South Islands: Local. Mount Egmont Ranges, *S. Percy Smith!* near Nelson, *Kirk*. (Europe; West Asia.)
- Sisyrinchium chilense*, Hook. Bot. Mag. t. 2786. North and South Islands: Fields and waste places from Auckland to Otago, but often local. (South America.)
- Sisyrinchium micranthum*, Cav. Diss. vi. 345, t. 191; Benth. Fl. Austral. vi. 412. North Island: Sandy shores of Spirits Bay, North Cape district, *T. F. C.* (South America.)
- Antholyza æthiopica*, Linn. Syst. ed. x. 863. North Island: Fields and waste places, a common garden escape in the vicinity of Auckland. (South Africa.)

AMARYLLIDACEÆ.

- Agave americana*, Linn. Sp. Plant. 323; Bak. Amaryll. 180. *American Aloe*. North Island: Old plants produce a multitude of suckers, and the species thus maintains itself in several localities. (Tropical America.)

LILIACEÆ.

- Asparagus officinalis*, Linn. Sp. Plant. 313; Hook. f. Student's Fl. 403. *Asparagus*. North Island: Waste places, not common. Usually solitary plants are seen, doubtless originating from seeds conveyed from gardens by birds. (Europe; North Asia; North Africa.)
- Aloe latifolia*, Haw. Syn. Pl. Succ. 82. North Island: A garden escape in the vicinity of Auckland. (South Africa.)
- Asphodelus fistulosus*, Linn. Sp. Plant. 309. North Island: Roadsides and waste places from Mongonui to Napier, not uncommon. South Island: Westport, *Townson!* (South Europe; West Asia; North Africa.)
- Allium vineale*, Linn. Sp. Plant. 299. Hook. f. Student's Fl. 405. *Crow Garlic*. North Island: Fields and waste places, not uncommon in the Auckland Provincial District. (Europe; North Africa.)

JUNCÆ.

- Juncus glaucus*, Sibth. Fl. Oxon. 113; Hook. f. Student's Fl. 414. South Island: Between Hokitika and Ross, *Kirk*. (Europe; North Asia; North Africa.)
- Juncus Gerardi*, Loisel. in Desv. Journ. Bot. ii. (1809) 284; Hook. f. Student's Fl. 417. South Island: Near Dunedin, *Petrie!* (Europe; North Asia; North America.)
- Juncus obtusiflorus*, Ehrh. Beitr. vi. 83; Hook. f. Student's Fl. 417. South Island: Lake Waiholo, *Petrie!* (Europe; North Africa.)

ARACEÆ.

- Colocasia antiquorum*, Schott, Meletem. i. 18; Benth. Fl. Austral. vii. 155. *Taro*. North Island: Formerly cultivated by the Maoris, and still lingering in many deserted plantations. (Native country uncertain; extensively cultivated in the tropics.)
- Richardia africana*, Kunth in Mem. Mus. Par. iv. (1818) 433. *White Arum*. North Island: An abundant garden escape in the Auckland Provincial District, rarer further south. (South Africa.)

ALISMACEÆ.

- Alisma Plantago*, Linn. Sp. Plant. 342; Hook. f. Student's Fl. 427. *Water Plantain*. North and South Islands: Watercourses in the Hawke's Bay District, *H. Hill!* *A. Hamilton!* interior of Otago, *Petrie!* (Europe; North and West Asia to the Himalayas; Australia.)

NATADEÆ.

- Aponogeton distachyon*, Thunb. Nov. Gen. 74; Fl. Cap. vii. 43. North Island: Naturalised in streams at Waimate, Bay of Islands. (South Africa.)

CYPERACEÆ.

- Cyperus rotundus*, Linn. Sp. Plant. 45; Benth. Fl. Austral. vii. 279. *Nut-grass*. North Island: A troublesome weed in several gardens in the vicinity of Auckland. (Most tropical and warm temperate regions.)
- Cyperus lucidus*, R. Br. Prodr. 218; Benth. Fl. Austral. vii. 283. North and South Islands: Fields and waste places, local. Mongonui, *T. F. C.*; Rangaunu Harbour and Kaitaia, *R. H. Matthews* and *H. Carse*! vicinity of Nelson, *T. F. C.* (Australia.)
- Carex divisa*, Huds. Fl. Angl. i. 348; Hook. f. Student's Fl. 449. *C. chlorantha*, T. Kirk in Trans. N.Z. Inst. x. (1878) App. xli., not of R. Br. North Island: Waste places near Auckland, rare. (Europe; North and West Asia to the Himalayas; North and South Africa.)
- Carex muricata*, Linn. Sp. Plant. 974; Hook. f. Student's Fl. 451. South Island: Pelorus Valley, *J. Rutland*! (Europe; North Asia to the Himalayas; North Africa; North America.)
- Carex flacca*, Schreb. Spicil. 669; *C. glauca*, Scop. Fl. Carn. ii. 223; Hook. f. Student's Fl. 456. North Island: Fields and waste places. Whangarei, *H. Carse*; vicinity of Auckland, *T. F. C.*; near Wellington, *Kirk*! (Europe; North Asia to India; North Africa.)
- Carex panicea*, Linn. Sp. Plant. 977; Hook. f. Student's Fl. 457. North Island: Fields and waste places, local. (Europe; North Asia; North America.)
- Carex longifolia*, R. Br. Prodr. 242; Benth. Fl. Austral. vii. 448. North Island: Fields near Auckland, rare, *T. F. C.* (Australia.)

GRAMINEÆ.

- Andropogon annulatus*, Forsk. Fl. Egypt. Arab. 173; Benth. Fl. Austral. vii. 531. North Island: Waste places at Mongonui, *T. F. C.* (Tropical Asia; tropical Africa; Australia.)
- Anthistiria imberbis*, Retz. Obs. iii. 11; *A. ciliata*, Benth. Fl. Austral. vii. 542 (not of Linn. f.). *Kangaroo-grass*. North Island: Fields and waste places. Bay of Islands; Whangaparaoa, near Auckland, *T. F. C.*; vicinity of Wellington, *Kirk*! (Tropical Asia; tropical and South Africa; Australia.)
- Paspalum dilatatum*, Poir. Encycl. v. 35. North Island: Often sown as a forage plant, and increasing in several localities. (South America.)
- Panicum sanguinale*, Linn. Sp. Plant. 57; Benth. Fl. Austral. vii. 469. *Crab-grass*. North and South Islands: Waste places and cultivated grounds, a common weed. (Most warm countries.)
- Panicum glabrum*, Gaud. Agrost. i. 22; Hook. f. Student's Fl. 469. North Island: An occasional weed in cultivated grounds, but not nearly so plentiful as the preceding. (Most warm countries.)
- Panicum Crus-galli*, Linn. Sp. Plant. 56; Hook. f. Student's Fl. 469. *Cockspur-grass*. North and South Islands: Waste places as far south as Canterbury and Westport, not uncommon. (Most warm countries.)
- Panicum colonum*, Linn. Syst. ed. x. 870; Benth. Fl. Austral. vii. 478. North Island: Waste places from Auckland to Wellington, rare. (Most warm countries.)
- Setaria glauca*, Beauv. Agrost. 51; Benth. Fl. Austral. vii. 492. North and South Islands: Waste places and cultivated fields, not uncommon. (Most warm and many temperate countries.)
- Setaria verticillata*, Beauv. Agrost. 51; Benth. Fl. Austral. vii. 494. North Island: Napier, *Colenso*. South Island: Ashburton, *W. W. Smith*. (A common weed in many warm and temperate countries.)

- Setaria viridis*, Beauv. Agrost. 51; Benth. Fl. Austral. vii. 494. North Island: Waste places and cultivated fields, not uncommon. (Most warm climates.)
- Setaria imberbis*, Roem. and Schult. Syst. ii. 891. North Island: Ballast at Wellington, *Kirk!* (Tropical America; tropical and South Africa.)
- Stenotaphrum glabrum*, Trin. Fund. Agrost. 176; *S. americanum*, Schrank. Pl. Rar. Hort. Monac. 98. *Buffalo-grass*. North Island: A common escape from cultivation. (Tropics of both hemispheres, usually near the sea.)
- Zizania aquatica*, Linn. Sp. Plant. 991; Asa Grav, Man. 540. *Canadian Wild Rice*. North Island: Naturalised by the Northern Wairoa River, near Aratapu. (North America; North-eastern Asia.)
- Phalaris canariensis*, Linn. Sp. Plant. 54; Hook. f. Student's Fl. 471. *Canary-grass*. North and South Islands: Fields and waste places, abundant. (South Europe; North Africa.)
- Phalaris arundinacea*, Linn. Sp. Plant. 55; Hook. f. Student's Fl. 472. *Reed-grass*. North Island: Vicinity of Wellington, *Kirk*. (Europe; North and West Asia to India.)
- Anthoxanthum odoratum*, Linn. Sp. Plant. 28; Hook. f. Student's Fl. 472. *Sweet Vernal-grass*. North and South Islands, Stewart Island: Abundant throughout. (Europe; North Asia.)
- Stipa verticillata*, Nees in Spreng. Syst. iv. Cur. Post. 30. North and South Islands: Near Wellington, *Kirk!* Nelson, *Travers*. (Australia.)
- Phleum pratense*, Linn. Sp. Plant. 59; Hook. f. Student's Fl. 475. *Timothy*. North and South Islands: Pastures, &c., abundant. (Europe; North and West Asia; North Africa.)
- Alopecurus pratensis*, Linn. Sp. Plant. 60; Hook. f. Student's Fl. 474. *Meadow Foxtail*. North and South Islands: Meadows and pastures, not uncommon. (Europe; North Asia.)
- Alopecurus agrestis*, Linn. Sp. Plant. ed. ii. 89; Hook. f. Student's Fl. 473. *Slender Foxtail*. North and South Islands: Fields and roadsides, not common. (Europe; North and West Asia.)
- Polypogon monspeliensis*, Desf. Fl. Atlant. i. 66; Hook. f. Student's Fl. 478. *Beard-grass*. Kermadec Islands, North and South Islands: Roadsides and waste places, abundant. (South Europe; West Asia to India and China; North and South Africa.)
- Polypogon fugax*, Nees in Steud. Syn. Pl. Gram. 184; Benth. Fl. Austral. vii. 547. North and South Islands: Ditches and salt marshes, not uncommon. (Tropical Asia; Australia.)
- Agrostis vulgaris*, With. Brit. Pl. ed. iii. 2, 132; Hook. f. Student's Fl. 477. *Red-top*. North and South Islands: Fields and waste places, abundant throughout. (Europe; North Asia; North America.)
- Agrostis alba*, Linn. Sp. Plant. 63; Hook. f. Student's Fl. 477. *Fiorin*. North and South Islands: Pastures and waste places, plentiful throughout. (Europe; North Asia; North America.)
- Gastridium australe*, Beauv. Agrost. 21; *G. lendigerum*, Gaud.; Hook. f. Student's Fl. 479. *Nit-grass*. North Island: Roadsides and waste places, not uncommon. (Europe; West Asia; North Africa.)
- Ammophila arundinacea*, Host, Gram. Austr. iv. 24, t. 41; Hook. f. Student's Fl. 481. *Marram-grass*. North and South Islands: Frequently planted for binding the surface of sand-dunes, and increasing in several localities. (Sandy shores of Europe; North Africa.)
- Lagurus ovatus*, Linn. Sp. Plant. 81; Hook. f. Student's Fl. 481. *Hare's-tail Grass*. North and South Islands: Sandy places, often near the sea. (South Europe; West Asia; North Africa.)
- Holcus lanatus*, Linn. Sp. Plant. 1048; Hook. f. Student's Fl. 483. *Soft-grass*. North and South Islands, Chatham Islands: Fields and waysides, abundant. (Europe; North Asia; North Africa.)
- Holcus mollis*, Linn. Syst. ed. x. 1305; Hook. f. Student's Fl. 484. *Soft-grass*. North and South Islands: Not so common as the preceding. (Europe; North Asia; North Africa.)

- Aira caryophyllea*, Linn. Sp. 1. lant. 66; Hook. f. Student's Fl. 482. *Hair-grass*. North and South Islands: Meadows and roadsides, abundant. (Europe; North Asia; North Africa.)
- Aira præcox*, Linn. Sp. Plant. 65; Hook. f. Student's Fl. 482. *Hair-grass*. North and South Islands: Fields and waste places, not uncommon. (Europe; West Asia.)
- Deschampsia flexuosa*, Trin. in Bull. Sc. Acad. Petersb. i. (1836) 66; Hook. f. Student's Fl. 483. North and South Islands, Stewart Island: Heathy places, local. (Europe; North and West Asia; North America; Fuegia.)
- Avena sativa*, Linn. Sp. Plant. 79. *Common Oat*. North and South Islands: An abundant escape from cultivation. (Native country uncertain; probably a form of the following species.)
- Avena fatua*, Linn. Sp. Plant. 80; Hook. f. Student's Fl. 484. *Wild Oat*. North and South Islands: Waste places and cultivated fields, abundant throughout. (Europe; North Asia to the Himalayas; North Africa.)
- Avena strigosa*, Schreb. Spic. 52; Hook. f. Student's Fl. 485. *Hairy Oat*. North and South Islands: Cultivated fields, not common. (Europe; North and West Asia.)
- Avena pubescens*, Huds. Fl. Angl. 42; Hook. f. Student's Fl. 485. *Downy Oat*. South Island: Fields in Canterbury and Otago, not uncommon. (Europe; North Asia.)
- Arrhenatherum avenaceum*, Beauv. Agrost. 55, t. 11, f. 5; Hook. f. Student's Fl. 485. North and South Islands: Fields and waste places, not common. (Europe; North Asia; North Africa.)
- Cynodon Dactylon*, Pers. Syn. Pl. i. 85; Hook. f. Student's Fl. 486. *Doab-grass*. North and South Islands: Fields and waste places, abundant. (All warm climates and many temperate ones.)
- Triodia decumbens*, Beauv. Agrost. 76, t. 15, f. 9; Hook. f. Student's Fl. 486. North Island: Fields and waste places, not uncommon. (Europe; North Africa.)
- Eragrostis major*, Host, Gram. Austr. iv. t. 24; *E. megastachya*, Link. Hort. Berol. i. 187. North Island: Mangatangi (near Mercer), *S. J. Vining!* (South Europe; tropical Asia.)
- Eragrostis minor*, Host, Gram. Austr. iv. 15. North Island: Ballast at Wellington, Kirk. (South Europe; West Asia to India; North Africa.)
- Eragrostis Brownii*, Nees, in Steud. Syn. Glum. i. 279; Benth. Fl. Austral. vii. 646. North Island: Fields and waste places, abundant. (Australia.)
- Briza maxima*, Linn. Sp. Plant. 70. *Trembling-grass*. North and South Islands: An occasional garden escape. (South Europe; North Africa.)
- Briza minor*, Linn. Sp. Plant. 70; Hook. f. Student's Fl. 491. *Trembling-grass*. North and South Islands: Fields and waste places, not uncommon. (Europe; North Africa.)
- Dactylis glomerata*, Linn. Sp. Plant. 71; Hook. f. Student's Fl. 490. *Cock's-foot-grass*. North and South Islands, Stewart Island, Chatham Islands: Plentiful throughout. (Europe; North and West Asia to India; North Africa.)
- Cynosurus cristatus*, Linn. Sp. Plant. 72; Hook. f. Student's Fl. 488. *Dog's-tail-grass*. North and South Islands: Fields and meadows, not uncommon. (Europe; West Asia to the Caucasus; North Africa.)
- Cynosurus echinatus*, Linn. Sp. Plant. 72; Hook. f. Student's Fl. 488. North Island: Waste places near Gisborne, *Bishop Williams!* (Europe; West Asia; North Africa.)
- Poa annua*, Linn. Sp. Plant. 68; Hook. f. Student's Fl. 491. *Annual Meadow-grass*. From the Kermadec Islands and the North Cape southwards to Macquarie Island: Waste places, &c., abundant. (Europe and temperate Asia; but now naturalised in most parts of the world.)
- Poa pratensis*, Linn. Sp. Plant. 67; Hook. f. Student's Fl. 492. *Meadow-grass*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, abundant throughout. (Europe; North and West Asia to the Himalayas; North America.)

- Poa compressa*, Linn. Sp. Plant. 69; Hook. f. Student's Fl. 492. North Island: Fields and waste places, not common. (Europe; North and West Asia.)
- Poa trivialis*, Linn. Sp. Plant. 67; Hook. f. Student's Fl. 492. North and South Islands: Fields and waste places, not uncommon. (Europe; North Asia; North Africa.)
- Poa nemoralis*, Linn. Sp. Plant. 69; Hook. f. Student's Fl. 492. North and South Islands: Shaded places, not common. (Europe; North Asia to the Himalayas; North America.)
- Glyceria aquatica*, Wahlenb. Fl. Goth. 18; Hook. f. Student's Fl. 494. Reed-grass. South Island: Near Ashburton, W. W. Smith; Taieri Plains and Catlin's, Petrie! (Europe; North and West Asia; North America.)
- Glyceria fluitans*, R. Br. Prodr. 179; Hook. f. Student's Fl. 494. Floating Manna-grass. North and South Islands: Not uncommon in wet places. (Europe; North and West Asia to the Himalayas; North Africa; North America.)
- Atropis distans*, Griseb. in Ledeb. Fl. Ross. iv. 388; *Glyceria distans*, Wahl.; Hook. f. Student's Fl. 495. North and South Islands: Salt marshes, not uncommon. (Europe; North Asia to the Himalayas; North Africa; North America.)
- Festuca elatior*, Linn. Sp. Plant. 75 (incl. *F. pratensis*, Huds.) Meadow Fescue. North and South Islands: Meadows and pastures, not uncommon. (Europe; North and West Asia; North America.)
- Festuca ovina*, Linn. Sp. Plant. 73; Hook. f. Student's Fl. 497. Sheep's Fescue. North and South Islands: Pastures and waste places, not uncommon. (Most temperate climates.)
- Festuca rubra*, Linn. Sp. Plant. 74; Hook. f. Student's Fl. 497. North and South Islands: Pastures and waste places, not uncommon. (Most temperate climates.)
- Festuca Myuros*, Linn. Sp. Plant. 74; Hook. f. Student's Fl. 497. North and South Islands: Dry places, not uncommon. (Europe; West Asia; North Africa.)
- Festuca bromoides*, Linn. Sp. Plant. 75; Hook. f. Student's Fl. 497. North and South Islands, Chatham Islands: Waste places and pastures, abundant. (Europe; West Asia; North Africa.)
- Scleropoa rigida*, Griseb. Spic. Fl. Rum. ii. 431: *Festuca rigida*, Kunth; Hook. f. Student's Fl. 498. North and South Islands: Roadsides and waste places, not common. (Europe; West Asia; North Africa.)
- Bromus erectus*, Huds. Fl. Angl. ed. i. 39; Hook. f. Student's Fl. 499. North and South Islands: Fields and waste places, not common. (Europe; West Asia; North Africa.)
- Bromus sterilis*, Linn. Sp. Plant. 77; Hook. f. Student's Fl. 500. North and South Islands: Fields and waste places, abundant. (Europe; North Asia; North Africa.)
- Bromus madritensis*, Linn. Cent. Plant. i. 5; Hook. f. Student's Fl. 500. North and South Islands: Waste places and roadsides, apparently not common. (Europe; North Africa.)
- Bromus tectorum*, Linn. Sp. Plant. 77. North Island: Vicinity of Auckland, Kirk. I have not seen New Zealand specimens. (Europe; North and West Asia; North Africa.)
- Bromus mollis*, Linn. Sp. Plant. ed. ii. 112; Hook. f. Student's Fl. 501. North and South Islands: Fields and waste places, abundant throughout. (Europe; North Asia; North Africa.)
- Bromus racemosus*, Linn. Sp. Plant. ed. ii. 114; Hook. f. Student's Fl. 501. North and South Islands: Fields and waste places, almost as plentiful as the preceding. (Europe; North Africa.)
- Bromus commutatus*, Schrad. Fl. Germ. i. 353; *B. racemosus* var. *commutatus*, Hook. f. Student's Fl. 501. North and South Islands: Fields and waste places, not uncommon. (Europe; North Africa.)

- Bromus patulus*, Mert. and Koch, in Roehl. Deutschl. Fl. i. 685. North Island: Ballast at Wellington, Kirk! (Europe; North and West Asia to China; North Africa.)
- Bromus arvensis*, Linn. Sp. Plant. 77; Hook. f. Student's Fl. 502. North and South Islands: Waste places, not common. (Europe.)
- Bromus unioloides*, H. B. K. Nov. Gen. i. 151; *Ceratochloa unioloides*, D.C.; Benth. Fl. Austral. vii. 662. *Prairie-grass*. North and South Islands: Fields and waste places, abundant. (North and South America.)
- Lolium perenne*, Linn. Sp. Plant. 83; Hook. f. Student's Fl. 503. *Rye-grass*. Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Fields and waste places throughout, abundant. (Europe; North Africa; West Asia.)
- Lolium italicum*, A. Br. in Flora, xvii. (1834) 259. *Italian Rye-grass*. North and South Islands: Fields and pastures, not uncommon. (South Europe; North Asia.)
- Lolium temulentum*, Linn. Sp. Plant. 83; Hook. f. Student's Fl. 503. *Darnel*. North and South Islands: Cultivated fields and waste places, not uncommon. (Europe; North and West Asia; now introduced into most temperate climates.)
- Lepturus incurvatus*, Trin. Fund. Agrost. 123; Benth. Fl. Austral. vii. 668. North Island: Salt marshes, not uncommon. (South Europe; North Africa; West Asia; Australia.)
- Agropyrum repens*, Beauv. Agrost. 102; Hook. f. Student's Fl. 504. *Couch-grass*. North and South Islands: Fields and waste places, not uncommon. (Europe; North Asia to the Himalayas; North Africa; North America.)
- Agropyrum pectinatum*, Beauv. Agrost. 102; Benth. Fl. Austral. vii. 666. North Island: Hawke's Bay, A. Hamilton! South Island: Eastern Otago, D. Petrie! (Australia.)
- Triticum sativum*, Lam. Fl. Fr. iii. 625. *Common Wheat*. North and South Islands: An occasional escape from cultivation. (Native country uncertain; now cultivated in most parts of the world.)
- Hordeum vulgare*, Linn. Sp. Plant. 84. *Common barley*. North and South Islands: An escape from cultivation. (Originally from West Asia; now widely cultivated.)
- Hordeum murinum*, Linn. Sp. Plant. 85; Hook. f. Student's Fl. 506. *Barley-grass*. North and South Islands: Waste places, abundant, especially on sandy ground near the sea. (Europe; West Asia; North Africa.)
- Hordeum maritimum*, With. Arr. Brit. Plant. 172; Hook. f. Student's Fl. 5 South Island: Akaroa, Kirk! (Europe; North Africa.)
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III. ALPHABETICAL LIST OF MAORI NAMES OF PLANTS.

THE following list of Maori plant-names has been compiled from various sources, such as the list given in the appendix to the "Hand-book," Williams's "New Zealand Dictionary," Mr. Colenso's botanical and ethnographical papers printed in various volumes of the "Transactions of the New Zealand Institute," &c. I particularly desire to acknowledge my indebtedness to the Right Rev. W. L. Williams, Bishop of Waiapu, for a very full and complete catalogue of all Maori plant-names known to him, including a great number not previously published. Bishop Williams's intimate acquaintance with both the Maori language and the botany of New Zealand has made his assistance most valuable, and I feel that any merit which this enumeration possesses is chiefly due to his friendly co-operation. Mr. Percy Smith has also furnished me with many new names and much valuable criticism; while Mr. Elsdon Best has supplied a copious list of plant-names in use in the Urewera Country. I have also received assistance from the Rev. F. R. Spencer, R. H. Matthews, F. A. D. Cox, A. Shand, and others, to all of whom my grateful thanks are due.

Aka (Colenso, Williams, &c.). A general name for the stem of any climbing plant.

Aka (Colenso, Tregear). *Metrosideros scandens*.

Aka (Williams). *Metrosideros florida*.

Aka (Colenso). *Passiflora tetrandra*.

Akakaimanu (Colenso). *Passiflora tetrandra*.

Akakiore (Williams, Tregear). *Parsonsia capsularis*.

Akakohia (Colenso). *Passiflora tetrandra*.

Akakura (E. B. Dickson). *Metrosideros diffusa*.

Akakura (Williams). *Metrosideros florida*.

Akapita (Colenso). *Rhipogonum scandens*.

Akapohue (Colenso). *Calystegia sepium*.

Akarewa (Williams). Cultivated variety of *Colocasia antiquorum*.

Akatawhiwhi (Williams, Tregear). *Metrosideros florida*.

Akatea (Williams, Tregear). *Metrosideros albiflora*.

Akatorotoro (Colenso). *Metrosideros scandens*.

Ake (Colenso, Williams). *Dodonæa viscosa*.

Akeake (Colenso, Williams). *Dodonæa viscosa*.

Akeake (Colenso, Hector). *Olearia avicenniæfolia*.

Akeake (G. Mair). *Olearia Traversii*.

Akepirau (Tregear). *Olearia Forsteri*. Probably the same as Akepiro.

Akepiro (Colenso, Williams). *Olearia furfuracea*.

Akerautangi (Colenso, Mantell). *Dodonæa viscosa*.

Akewharangi (Colenso). *Olearia Cunninghamii*.

Akiraho (Williams). *Olearia Forsteri*.

Angiangi (Williams, Tregear). *Coprosma Baueri*.

Anurangi (Williams). Cultivated variety of *Ipomœa batatas*.

- Anutipoki (Williams). Cultivated variety of *Ipomœa batatas*.
 Aoanga } (Colenso). *Phormium tenax* (variegated variety).
 Aohanga }
 Aruhe (Colenso, Williams). Rhizome of *Pteris aquilina*.
 Aute (Colenso, Williams, &c.). *Broussonetia papyrifera*.
 Aute (R. H. Matthews). *Veronica diosmæfolia*.
 Autetaranga (Colenso, Tregear). *Pimelea arenaria*.
 Autetauranga (Colenso). *Pimelea arenaria*.
 Awanga (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Awanga (Percy Smith). Variegated variety of *Phormium tenax*.
 Awhato, or Awheto (Colenso, Williams). The so-called vegetable caterpillar,
Cordyceps Robertsii.
 Eketera (D'Urville). *Lepidium oleraceum*.
 Emiemi (Tregear). *Dracophyllum latifolium*.
 Ewekuri (Williams). *Paratrophis heterophylla*.
 Haekaro (Tregear). *Pittosporum umbellatum*.
 Haka (Williams). *Erigeron canadensis*.
 Hakeke (Williams). A fungus, *Hirneola polytricha*.
 Hamo (Williams). Cultivated variety of *Ipomœa batatas*.
 Hangatare (F. A. D. Cox). *Olearia semidentata*.
 Hangehange (Colenso, Williams, &c.). *Geniostoma ligustrifolium*.
 Harakeke (Colenso, Williams, &c.). *Phormium tenax*.
 Harapere (F. A. D. Cox). *Phormium tenax*.
 Harareke (Colenso, Williams). *Phormium tenax*.
 Harore (Williams). A fungus, *Agaricus adiposus*.
 Hauama (Colenso, Williams). *Entelca arborescens*.
 Haukopa (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Haumakoroa (Williams, Traill). *Panax simplex*.
 Haumangoroa (Williams). *Panax simplex*.
 Hauora (Williams). *Cordyline Banksii*.
 Hawato (Williams). The vegetable caterpillar, *Cordyceps Robertsii*.
 Hawere (Colenso). Cultivated variety of *Ipomœa batatas*.
 Heketara (Williams). *Olearia Cunninghamii*.
 Hengahenga (Williams). *Geniostoma ligustrifolium*.
 Heruheru (Colenso, Williams). *Todea hymenophylloides* and *T. superba*.
 Hinahina (Hector, Williams). *Meliccytus ramiflorus*.
 Hinau (Yate, Cunningham, Colenso, &c.). *Elæocarpus dentatus*.
 Hingongi (Williams). Cultivated variety of *Solanum tuberosum*.
 Hioi (Williams). *Mentha Cunninghamii*.
 Hitara (Colenso). Cultivated variety of *Ipomœa batatas*.
 Hiwai (Williams). A general name for *Solanum tuberosum*.
 Hohere (Cunningham, Colenso, &c.). *Hoheria populnea*. Probably more correctly
 spelt Houhere.
 Hohere (Lyll). *Gaya Lyallii*.
 Hoho (F. A. D. Cox). *Pseudopanax chathamicum*. Probably should be Houhou.
 Hohoeke (Lyll, Williams). *Pseudopanax crassifolium*.
 Hoihere (Colenso, Williams). *Hoheria populnea*.
 Hokataka (F. A. D. Cox). *Corokia macrocarpa*.
 Homanoroa (Elsdon Best). *Panax Edgerleyi*. Possibly should be Houmanoroa.
 Hona (Elsdon Best). Fruit of *Fuchsia excorticata*.
 Horoeke (Polack, Cunningham, Colenso). *Pseudopanax crassifolium*.
 Horokaka (Williams). *Mesembryanthemum australe*.
 Horokio (Williams). *Lomaria capensis*.
 Horopito (Colenso, Williams). *Drimys axillaris*.
 Horopito (R. H. Matthews). *Alseuosmia macrophylla*.
 Houama (Williams). *Entelca arborescens*.
 Houhere (Colenso, Williams). *Hoheria populnea*.

Houhi (Williams, Elsdon Best). *Hoheria populnea*.
 Houhou (Williams, Elsdon Best). *Panax arboreum*.
 Houi (Colenso). *Hoheria populnea*.
 Houi (Traill). *Plagianthus betulinus*.
 Houka (Hector). *Cordyline australis*. Doubtless a misspelling for Kouka.
 Houma (Hector, Tregear). *Sophora tetraptera*.
 Houmapara (Williams). *Pseudopanax Lessonii*.
 Houparapara (Williams). *Pseudopanax Lessonii*.
 Houpara (Williams). *Pseudopanax Lessonii*.
 Huamango (Williams). Cultivated variety of *Solanum tuberosum*.
 Huarua (Elsdon Best). Seeds of *Coriaria ruscifolia*.
 Hue (Colenso, Williams). *Lagenaria vulgaris*. Also a general name for all gourds.
 Hue-o-Raukatauri (Elsdon Best). *Ourisia macrophylla*.
 Huiupoko (Williams). Cultivated variety of *Ipomœa batatas*.
 Hunangamoho (Colenso). *Stipa arundinacea*.
 Hunangamoho (Williams). *Danthonia Cunninghamii*.
 Hune (Colenso, Williams). Feathery seeds of *Typha*.
 Hupiro (Colenso). *Coprosma fetidissima*.
 Huruhuru-o-nga-wae-wae-o-Paoa (Williams). *Todea superba*.
 Huruhuruwhenua (Williams). *Asplenium lucidum*.
 Hutihuti (Williams). Cultivated variety of *Ipomœa batatas*.
 Hutiwai (Lyall, Williams). *Acœna sanguisorbæ*.
 Hutu (Colenso). *Fagus fusca*.
 Hutu (Hector). *Ascarina lucida*.
 Hutukawa (Williams). *Metrosideros tomentosa*.

Ihupuku (Williams). Cultivated variety of *Ipomœa batatas*.
 Inaka (Traill). *Dracophyllum longifolium*.
 Inakaporiro (Williams). *Cyathodes acerosa*.
 Inihina (A. Shand). *Melicytus ramiflorus*. Chatham Island. "Probably should be Inaina," Percy Smith.
 Irirangi (Elsdon Best). *Hymenophyllum demissum* and *H. dilatatum*.

Kahakaha (Colenso, Williams). *Astelia Solandri*.
 Kahia (Williams). *Passiflora tetrandra*.
 Kahika (Williams). *Podocarpus dacrydioides*.
 Kahikatea (Yate, Cunningham, Colenso, &c.). *Podocarpus dacrydioides*.
 Kahikatoa (Yate, Colenso, Williams). *Leptospermum scoparium*.
 Kahikomako (Colenso, Williams). *Pennantia corymbosa*.
 Kaho (Cunningham). *Linum monogynum*.
 Kahuorangi (Williams). Cultivated variety of *Colocasia antiquorum*.
 Kai (Williams). *Podocarpus spicatus*.
 Kaihuia (Williams). *Rhopalostylis sapida*.
 Kaikaia (Percy Smith). *Acœna sanguisorbæ*.
 Kaikaiaruhe (Percy Smith). *Acœna sanguisorbæ*.
 Kaikaiatua (Williams). *Rhabdothamnus Solandri*.
 Kaikaiatua (Williams). *Leucopogon fasciculatus*.
 Kaikaka (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kaikaro (Colenso). *Pittosporum crassifolium*.
 Kaikaro (Percy Smith). *Pittosporum tenuifolium*.
 Kaikatea (Polack, &c.). *Podocarpus dacrydioides*. Evidently a misspelling of Kahikatea.
 Kaikawaka (Colenso). *Libocedrus Doniana*.
 Kaikomako (Colenso, Williams). *Pennantia corymbosa*.
 Kaiku (Colenso). *Parsonsia capsularis*.
 Kaimanu (Williams). *Passiflora tetrandra*.
 Kairorowhare (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kaiweta (Percy Smith). *Melicytus lanceolatus*.

- Kaiwhiria (Colenso). *Hedycarya arborea*.
 Kaiwhiria (Williams). *Parsonsia capsularis*.
 Kaiwiria (Hector). *Panax simplex*.
 Kakaha (Hector). *Astelia nervosa*.
 Kakaho (Colenso, Williams). Culms of *Arundo conspicua*.
 Kakaramu (Williams). *Coprosma robusta* and *C. lucida*.
 Kakarangu (Williams). *Coprosma robusta*.
 Kakareao. *Rhipogonum scandens*.
 Kakatarahae (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kakatarahae (Williams). Cultivated variety of *Colocasia antiquorum*.
 Kamahi (Williams). *Weinmannia racemosa*.
 Kamu (Williams). *Bidens pilosa*.
 Kanawa (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kanga (Williams). *Zea mays*.
 Kanono (Williams). *Coprosma grandifolia*.
 Kanuka (Williams). *Leptospermum ericoides*.
 Kaoho (Elsdon Best). Fruiting specimens of *Solanum aviculare*.
 Kapana (Williams). A general name for *Solanum tuberosum*.
 Kapara (Williams). Resin of *Podocarpus dacrydioides*.
 Kapia (Colenso, &c.). Resin of *Agathis australis*.
 Kapuka (Traill, Williams). *Griselinia littoralis*.
 Karaka (Cunningham, Colenso, Williams, &c.). *Corynocarpus laevigatus*.
 Karamu (Colenso, Williams). *Coprosma robusta* and *C. lucida*.
 Karamu (Colenso). *Coprosma foetidissima*.
 Karamuramu (Williams). *Coprosma robusta*.
 Karango (Colenso, Williams). *Coprosma robusta* and *C. lucida*.
 Kareao (Colenso, Williams). *Rhipogonum scandens*.
 Karetu (Colenso, Williams). *Hierochloa redolens*.
 Karito (Lyall, Williams). *Typha angustifolia*.
 Karo (Colenso, Williams). *Pittosporum crassifolium*.
 Karo (Colenso). *Pittosporum cornifolium*.
 Katea (Williams). *Podocarpus dacrydioides*.
 Katoa (Williams). *Leptospermum scoparium*.
 Katote (Williams). *Hemitelia Smithii*.
 Katote (Percy Smith). *Cyathea dealbata*.
 Katoto (Williams). Cultivated variety of *Ipomœa batatas*.
 Katute (Hector). *Dicksonia antarctica*.
 Kauere (Colenso, Williams). *Vitex lucens*.
 Kauhanga-roa (Williams). *Phormium tenax*.
 Kauka (Tregear). *Cordyline australis*.
 Kauri (Yate, Polack, Cunningham, &c.). *Agathis australis*.
 Kauto } (Colenso). Cultivated varieties of *Ipomœa batatas*.
 Kautowhau }
 Kawa (Williams). *Piper excelsum*.
 Kawaka (Yate, Cunningham, Colenso, &c.). *Libocedrus Doniana*.
 Kawakawa (Colenso, Williams). *Piper excelsum*.
 Kawakawa (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Kawakawa (Elsdon Best). *Lomaria fluviatilis*.
 Kawakawa-tawhiti (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kawau (Williams). Cultivated variety of *Ipomœa batatas*.
 Keha (Williams). *Brassica campestris*.
 Keka (Williams). *Hirneola polytricha*.
 Keketeruhe (F. A. D. Cox). *Olearia Chathamica*.
 Kengo (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kiekie (Colenso, Williams, &c.). *Freycinetia Banksii*.
 Kinakina (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Kiokio (Williams, Elsdon Best). *Lomaria capensis*.
 Kiokiorangi (Colenso). Cultivated variety of *Ipomœa batatas*.

- Kirikaraka (Williams). Cultivated variety of *Ipomœa batatas*.
 Kiwikiwi (Elsdon Best). *Lomaria fluviatilis*.
 Koare (Williams). *Panax Edgerleyi*.
 Koare (Lindsay). *Typha angustifolia*.
 Koareare (Williams). *Panax Edgerleyi*.
 Koareare (Williams). Rhizome of *Typha angustifolia*.
 Koareare (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Koeata (Williams). Young shoots of *Pteris aquilina*.
 Kohe (Williams). *Passiflora tetrandra*.
 Kohe (Williams). *Dysoxylum spectabile*.
 Kohekohe (Yate, Colenso, &c.). *Dysoxylum spectabile*.
 Kohepi (Williams). Flowers of *Dysoxylum spectabile*.
 Kohepiro (Williams). *Angelica roseifolia*.
 Koheriki (Colenso, Williams). *Angelica roseifolia*.
 Koheriki (Cunningham, Williams). *Bidens pilosa*.
 Koheriki (Percy Smith). *Melicope ternata*.
 Kohi (Hector). *Schefflera digitata*.
 Kohia (Colenso, Williams). *Passiflora tetrandra*.
 Kohoho (Colenso, Williams). *Solanum aviculare*.
 Kohuhu (Colenso). *Pittosporum tenuifolium*.
 Kohukohu (Colenso). *Pittosporum tenuifolium*.
 Kohukohu (Lindsay). *Stellaria media*.
 Kohukohu (Cunningham). *Scleranthus biflorus*.
 Kohukohu (Percy Smith). A general name for Moss.
 Kohurangi (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Kohurangi (Williams). Cultivated variety of *Colocasia antiquorum*.
 Kohutuhutu (Colenso). *Fuchsia excorticata*.
 Koihu (Williams). *Pittosporum tenuifolium*.
 Kokaha (Elsdon Best). *Astelia Cunninghamii*.
 Kokaho (Handbook). *Arundo conspicua*. Doubtless a misspelling for Kakaho.
 Kokihi (Colenso, Williams). *Tetragonia expansa* and *T. trigyna*.
 Kokomuka (Colenso, Williams). *Veronica salicifolia*.
 Kokomuka-taranga (Williams). *Veronica parviflora*.
 Kokorangi (Williams). Cultivated variety of *Ipomœa batatas*.
 Kokoromiko (Williams). *Veronica salicifolia*.
 Kokoromuka (Williams). *Veronica salicifolia*.
 Komeke (Williams). Rhizome of *Pteris aquilina* prepared for eating.
 Konehu (Williams). Cultivated variety of *Ipomœa batatas*.
 Konehu-raupo (Williams). Pollen of *Typha*.
 Konene (R. H. Matthews). Fruit of *Cassythia paniculata*.
 Kongungu (Williams). Small tubers of *Ipomœa batatas*.
 Konini (Lyall, Williams). Fruit of *Fuchsia excorticata*.
 Kopakipaki (Williams). *Zea mays*.
 Kopakopa (Elsdon Best, Tregear). *Trichomanes reniforme*.
 Kopakopa (Tregear). *Myosotidium nobile*.
 Kopakopa (Williams). *Plantago* spp.
 Kopata (Lyall). *Pelargonium australe*.
 Kopata (Colenso). *Geum urbanum*.
 Kopi (Tregear). *Corynocarpus laevigatus*. Chatham Islands.
 Kopi (Polack). Fruit of *Corynocarpus* after steaming.
 Kopia (Williams). Kernels of *Corynocarpus* prepared for eating.
 Kopoti (Percy Smith). *Ligusticum aromaticum*.
 Kopukapuka (Elsdon Best). *Ranunculus hirtus*.
 Kopungawha (Percy Smith). Several species of *Juncus*.
 Kopupu (D'Urville). *Scirpus lacustris*.
 Kopupungawha (Williams, E. B. Dickson). *Scirpus lacustris*.
 Kopupungawha (E. B. Dickson). Several species of *Juncus*.
 Kopupungawha (Lindsay). *Typha angustifolia*.
 Korari (Colenso). Scape of *Phormium tenax* and *P. Cookianum*.

- Korari (Williams). *Phormium tenax* (the whole plant).
 Korau (Colenso, Williams). *Cyathea medullaris*.
 Korau (Williams). *Brassica campestris*.
 Koreherehe (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Koreirei (Colenso, Williams). Rhizome of *Typha*.
 Korikori (Tregear). *Ranunculus insignis*.
 Korito (Percy Smith). Young shoots of *Typha angustifolia*.
 Koroi (Colenso, Williams). Fruit of *Podocarpus dactyloides*.
 Korokio (Colenso, Williams). *Corokia buddleoides*.
 Korokio (H. C. Field). *Lomaria capensis* and *L. vulcanica*.
 Korokio-taranga (Cunningham, Colenso). *Corokia buddleoides*.
 Koromiko (Colenso, Williams). *Veronica salicifolia* and allied species.
 Koromiko-taranga (Colenso). *Veronica parviflora*.
 Koromiko-taranga (Williams). *Pimelea longifolia*.
 Koromuka (Colenso, &c.). *Veronica salicifolia* and allied species.
 Koromuti (Hector). *Panax simplex*.
 Koropiu (Percy Smith). *Lomaria capensis*.
 Koropuka (Williams). Variety of *Gaultheria antipoda*.
 Kotara (Elsdon Best). *Panax Edgerleyi*.
 Kotete (Williams). *Schefflera digitata*.
 Kotipo (Williams). Cultivated variety of *Solanum tuberosum*.
 Kotukutuku (Colenso, Williams). *Fuchsia excorticata*.
 Kouka (Lindsay). *Cordyline australis*.
 Kouka (Williams). Rhizome of *Typha*.
 Kowhai (Colenso, Williams). *Sophora tetraptera*.
 Kowhai (Elsdon Best). *Geum urbanum*.
 Kowhaikura (Williams). *Potentilla anserina*.
 Kowhaingutukaka (Cunningham, Colenso, &c.). *Chanthus puniceus*.
 Kowhangatara (E. B. Dickson). *Spinifex hirsutus*.
 Kowharawhara (Colenso, Williams). *Astelia Cunninghamii* and *A. Banksii*.
 Kowhitiwhiti (Lindsay). *Nasturtium officinale*.
 Kowhiwhi (Williams). *Pittosporum tenuifolium*.
 Kueo (Elsdon Best). Berries of *Coprosma grandifolia*.
 Kumara (Polack, Cunningham, &c.). *Ipomœa batatas*.
 Kumarahou (Colenso, Williams). *Pomaderris elliptica*.
 Kumarahou (R. H. Matthews). *Pomaderris Edgerleyi*.
 Kumarahou (Williams). *Quintinia serrata*.
 Kumarahou (Elsdon Best). *Angelica rosæfolia*.
 Kumarahou (Elsdon Best). *Olearia Colensoi*.
 Kumara-kai-torouka (Williams). *Olearia furfuracea*.
 Kupapa (Cunningham). *Passiflora tetrandra*.
 Kuranui-paka (Williams). *Dicksonia fibrosa*.
 Kururangi (Colenso). Cultivated variety of *Ipomœa batatas*.
 Kurawaka (Percy Smith). Capsule of *Phormium tenax*.
 Kurikuri (Lyall). *Aciphylla squarrosa* and *A. Colensoi*.
 Kuripaka (Williams). *Dicksonia fibrosa*.
 Kuriwao (Hector). *Rhipogonum scandens*. Evidently a misspelling of Kareao.
- Mahetau (Williams). *Solanum tuberosum*.
 Mahimahi (Colenso, Williams). *Elæocarpus Hookerianus*.
 Mahoe (Yate, Cunningham, Colenso). *Melicytus ramiflorus*.
 Mahoe (F. A. D. Cox). *Hymenanthera Chathamica*.
 Mahoewao (Williams). *Melicytus lanceolatus*.
 Mahonge (Williams). A cultivated variety of *Cordyline*.
 Mahunu (Williams). Young shoots of *Pteris aquilina*.
 Mahuri (Raoul). *Alternanthera sessilis*.
 Mai (Cunningham, Williams). *Podocarpus spicatus*.
 Maikaika (Colenso). *Orthoceras strictum*.
 Maikaika (Lyall). *Thelymitra pulchella*.

- Maikaika (Elsdon Best). *Microtis porrifolia*.
 Maikaika (Colenso). *Arthropodium cirrhatum*.
 Maikuku (Percy Smith). *Thelymitra longifolia*.
 Maire (Colenso, Williams). *Olea Cunninghamii* and *O. lanceolata*.
 Maire (Colenso, Williams). *Fusanus Cunninghamii*.
 Mairehau (Colenso). *Phebalium nudum*.
 Maireaunui (Colenso). *Olea Cunninghamii*.
 Mairetawhake (Colenso, Williams). *Eugenia maire*.
 Makaka (Hector). *Carmichaelia australis*.
 Makaka (Tregear). *Ackama rosæfolia*.
 Makakaka (Williams). *Polygonum aviculare*.
 Makakauri (Williams). Cultivated variety of *Ipomœa batatas*.
 Makatiti (Williams). Cultivated variety of *Colocasia antiquorum*.
 Makomako (Cunningham, Colenso, &c.). *Aristolelia racemosa*.
 Makura (F. A. D. Cox). *Olearia semidentata*.
 Makururangi (Colenso). Cultivated variety of *Ipomœa batatas*.
 Makutu (Williams). Cultivated variety of *Ipomœa batatas*.
 Mamaika (Williams). *Orthoceras strictum*.
 Mamaku (Colenso, Williams, &c.). *Cyathea medullaris*.
 Mamaku (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Mamangi (Williams). *Coprosma Baueri*.
 Mamangi (E. B. Dickson). *Coprosma arborea*.
 Manatu (Williams). *Plagianthus betulinus*.
 Manawa (Cunningham, Colenso, &c.). *Avicennia officinalis*.
 Mangahuripapa (Elsdon Best). *Libertia ixioides*.
 Mangeao (Colenso, Williams). *Litsæa calicaris*.
 Mangemange (Colenso, Williams). *Lygodium articulatum*.
 Mania (Williams). *Carex lucida*.
 Manihi (Williams). *Potamogeton natans* and *P. Cheesemanii*.
 Manoa (Colenso). *Dacrydium Colensoi*.
 Manono (Williams). *Coprosma grandiflora*.
 Manuka (Colenso, Williams, &c.). *Leptospermum scoparium*.
 Manukauriki (Colenso). *Leptospermum ericoides*.
 Maomao (Colenso). Cultivated variety of *Ipomœa batatas*.
 Maomao (Williams). A variety of *Phormium tenax*.
 Mapara (Colenso). Heart-wood of *Dacrydium cupressinum*.
 Mapau (Colenso, Williams). *Myrsine Urvillei*.
 Mapauriki (Cunningham). *Pittosporum tenuifolium*.
 Mapere (Williams). *Gahnia* spp.
 Mapou (Williams). *Myrsine Urvillei*.
 Mapua (Colenso). Cultivated variety of *Ipomœa batatas*.
 Maramawhiti (Colenso). Cultivated variety of *Ipomœa batatas*.
 Maratata (Williams). *Polypodium Billiardieri*.
 Marere (Williams). Variety of *Ipomœa batatas* used in the ceremony of "pur."
 Mariri (Williams). Unripe fruit of *Beilschmiedia Tawa*.
 Marohi (Williams). Rhizome of *Pteris aquilina*.
 Maru (Williams). *Leptospermum ericoides*.
 Maru (Colenso, Williams). *Sparganium antipodum*.
 Maruru (Elsdon Best). *Ranunculus hirtus*.
 Mata (Williams). *Carex teretiuscula*.
 Matai (Yate, Colenso, Williams, &c.). *Podocarpus spicatus*.
 Mataira (F. A. D. Cox). *Myrsine Urvillei*. Chatham Islands.
 Matakauri (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Matamatahuia (Williams). *Linum monogynum*.
 Matangoa (Hugel). *Cardamine stylosa*.
 Matata (Williams). *Rhabdothamnus Solandri*.
 Matata (Elsdon Best). *Pteris scaberula* and *P. incisa*.
 Matatiti (Colenso). Cultivated variety of *Colocasia antiquorum*.

- Matau (Elsdon Best). *Uncinia* spp.
 Matau-a-Mai (Williams). *Uncinia australis*.
 Matauririki (Elsdon Best). *Uncinia leptostachya* and *U. riparia*.
 Matawaiwai (Williams). Cultivated variety of *Ipomœa batatas*.
 Mati (Tregear). Fruit of *Fuchsia excorticata*.
 Matipou (Lyall, Williams). *Myrsine Urvillei*.
 Matou (Williams). Fruit of *Drimys axillaris*.
 Matuakumara (Colenso). *Geranium dissectum*.
 Matuamauku (Elsdon Best). *Hymenophyllum dilatatum*.
 Matukuroimata (R. H. Matthews). *Alseuosmia quercifolia*, *A. Banksii*, and *A. linearifolia*.
 Maukoro (Lindsay, Williams). *Carmichaelia flagelliformis*.
 Mauku (Williams). *Cordyline pumilio*.
 Mauku (Williams). *Hymenophyllum* spp.
 Mauku (Elsdon Best). *Asplenium bulbiferum*.
 Maurea (Williams). *Carex lucida* and *C. comans*.
 Mauri (Elsdon Best). *Astelia* sp.
 Mauri (Williams). Totara timber of dark colour.
 Mawe (Elsdon Best). *Galium umbrosum*.
 Mawhai (Colenso, Williams). *Sicyos angulatus*.
 Mawhai (R. H. Matthews). *Cassytha paniculata*.
 Meke (Williams). Rhizome of *Pteris aquilina*.
 Mengirangi (Colenso). Cultivated variety of *Ipomœa batatas*.
 Mikimiki (Williams). *Cyathodes acerosa*.
 Miko (Williams). *Rhopalostylis sapida*.
 Mikoikoi (Percy Smith). *Libertia ixioides*.
 Mingi (Lindsay). *Coprosma propinqua*.
 Mingi (Colenso). *Cyathodes acerosa* and *Leucopogon fasciculatus*.
 Mingimingi (Lindsay, Williams). *Cyathodes acerosa* and *Leucopogon fasciculatus*.
 Miro (Yate, Cunningham, Colenso, &c.). *Podocarpus ferrugineus*.
 Moeahu (Williams). *Melicytus ramiflorus*.
 Mohani } (Williams). Rhizome of *Pteris aquilina*.
 Moheke }
 Moii (Williams). Cultivated variety of *Ipomœa batatas*.
 Mokimoki (Colenso). *Doodia caudata*.
 Mokimoki (Williams). *Mentha Cunninghamii*.
 Mokopiko (Bidwill). *Libocedrus Doniana*.
 Monehu (Williams). Young shoots of *Pteris aquilina*.
 Monenehu (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Monoao (Williams). *Dracophyllum subulatum*.
 More (Williams). A variety of the timber of *Agathis australis*.
 Motuhanga (Percy Smith). Rhizome of *Pteris aquilina*.
 Mouki (Percy Smith). *Asplenium bulbiferum*.
 Mouku (Tregear). *Marattia salicina*.
 Mouku (Percy Smith). *Asplenium bulbiferum*.
 Mouna (H. C. Field). *Lygodium articulatum*.
 Muka (Mantell, Williams). *Rhopalostylis sapida*.
 Muka (Colenso, Williams). Prepared fibre of *Phormium*.
 Mukimuki (Williams). *Doodia caudata*.
 Munga (Williams). *Rhopalostylis sapida*.
 Nahinahi (Lindsay, Williams). *Calystegia sepium*.
 Nahui (Cunningham). *Alternanthera sessilis*.
 Namunamu (Elsdon Best). *Geranium molle*.
 Nani (Williams). *Brassica campestris*.
 Nao (D'Urville). *Linum monogynum*.
 Napuka (Cunningham). *Veronica speciosa*.
 Nau (Williams). *Lepidium oleraceum*.

- Naupata (Colenso, Williams). *Coprosma Baueri*.
 Naupiro (Tregear). *Coprosma foetidissima*.
 Neinei (Colenso, Williams). *Dracophyllum latifolium*.
 Neinei (Lyll). *Carmichaelia* spp.
 Neineikura (Williams). *Hemitelia Smithii*.
 Ngaio (Colenso, Williams). *Myoporum laetum*.
 Ngakaukore (Tregear). *Carmichaelia* sp.
 Ngakaukuri (Williams). Cultivated variety of *Ipomœa batatas*.
 Ngakomoa (Colenso). Cultivated variety of *Ipomœa batatas*.
 Ngapara (Percy Smith). Resinous heart-wood of *Dacrydium cupressinum*.
 Ngaue (Williams). Cultivated variety of *Colocasia antiquorum*.
 Ngawha (Lindsay). *Typha angustifolia*.
 Nghungohu (Elsdon Best). *Cyathodes acerosa* and *Leucopogon fasciculatus*.
 Ngongoro (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Nikau (Cunningham, Colenso, Williams, &c.). *Rhopalostylis sapida*.
 Niko (Williams). *Brassica* sp.
 Niniao (Elsdon Best). *Helichrysum glomeratum*.
 Niniwa (Williams). *Gaultheria oppositifolia*.
 Oho (Hector, Tregear). *Pseudopanax Lessonii*. Probably a mistake for Houhou.
 Ohoeka (Lindsay, Williams). *Pseudopanax crassifolium*.
 Oioi (Colenso). *Leptocarpus simplex*.
 Ongaonga (Colenso, Williams). *Urtica ferox* and *U. incisa*.
 Orewa (Hector). *Sideroxylon costatum*.
 Oru (Cunningham, Colenso). *Colensoa physaloides*.
 Oue (Williams). A variety of *Phormium tenax*.
 Paea (Williams). Cultivated variety of *Ipomœa batatas*.
 Paea (Percy Smith). *Brassica oleracea*.
 Paeangaanga (Colenso, Williams). Cultivated variety of *Colocasia antiquorum*.
 Paetai (Percy Smith). *Avicennia officinalis*.
 Pahau (Percy Smith). Cultivated variety of *Lagenaria vulgaris*.
 Pahau-kakapo (Elsdon Best). *Dawsonia superba*.
 Pahautea (Colenso). *Libocedrus Bidwillii*.
 Pahengahenga (Williams). *Geniostoma ligustrifolium*.
 Paihaukaka (Colenso). Cultivated variety of *Ipomœa batatas*.
 Pakakohi (Williams). Rhizome of *Pteris aquilina*.
 Pakaue (Williams). Cultivated variety of *Colocasia antiquorum*.
 Pakauroharoha (Elsdon Best). *Polypodium pennigerum*.
 Pakue (Hector). *Dicksonia squarrosa*.
 Panahi (Colenso). Cultivated variety of *Ipomœa batatas*.
 Panahi (Colenso, Williams). *Calystegia sepium*.
 Panahi (R. H. Matthews). *Ipomœa palmata*.
 Panake (Colenso). *Calystegia sepium*.
 Panakenake (Elsdon Best). *Pratia angulata*.
 Panako (Williams). *Asplenium obtusatum* and *A. lucidum*.
 Panapana (Colenso). *Cardamine hirsuta*.
 Pane (Colenso). Cultivated variety of *Ipomœa batatas*.
 Papa (Williams). *Geniostoma ligustrifolium*.
 Papahaoa (Williams). Cultivated variety of *Ipomœa batatas*.
 Papaii (Colenso). *Aciphylla squarrosa*.
 Papaka (Williams). Cultivated variety of *Solanum tuberosum*.
 Papakoura (Elsdon Best). *Epilobium microphyllum*.
 Papataniwhaniwha (Williams). *Lagenophora Forsteri*.
 Papauma (Colenso). *Coprosma grandifolia*.
 Papauma (Williams). *Griselinia littoralis*.
 Para (Colenso, Williams). *Marattia fraxinea*.
 Para (Williams). Cultivated variety of *Cordyline*.
 Paraharaha, Elsdon³Best). *Polypodium Billiardieri*.

- Parahia (Colenso). *Chenopodium pusillum*.
 Parakaraka (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Paranako (Williams). *Asplenium obtusatum* and *A. lucidum*.
 Parani (Elsdon Best). *Lagenophora petiolata*.
 Parapara (Colenso). *Pisonia Brunoniana*.
 Parapara (Williams). *Pseudopanax Lessonii*.
 Parapara (Elsdon Best). *Panax arboreum*.
 Parara (Williams). Rhizome of *Pteris aquilina*.
 Parareka (Williams). *Solanum tuberosum*.
 Parareka (H. C. Field). *Marattia fraxinea*.
 Parataniwha (Lyll, Colenso). *Elatostemma rugosum*.
 Paratawhiti (Williams). *Orthoceras strictum*.
 Paratawhiti (H. C. Field, E. B. Dickson). *Marattia fraxinea*.
 Parate (Williams). *Zea mays*.
 Parenako (Williams). *Asplenium obtusatum* and *A. lucidum*.
 Parerara (Lindsay, Williams). *Plantago sp.*
 Paretao (Colenso). *Asplenium obtusatum* and *A. lucidum*.
 Paretarakihi (Percy Smith). Cultivated variety of *Lagenaria vulgaris*.
 Paretana (Williams). Cultivated variety of *Ipomœa batatas*.
 Parete (Williams). *Solanum tuberosum*.
 Paritaniwha (Williams). Variety of *Phormium tenax*.
 Pata (Williams). *Leptospermum scoparium*.
 Patai (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Pate (Lyll, Williams). *Schefflera digitata*.
 Pate (Polack, Cunningham, Colenso, &c.). *Schefflera digitata*.
 Patea (Colenso). Cultivated variety of *Ipomœa batatas*.
 Patete (Williams). *Schefflera digitata*.
 Patiti (Williams). *Microtœna stipoides*.
 Patiti (Tregear). *Agropyrum scabrum*.
 Patotara (Colenso, Elsdon Best). *Leucopogon Fraseri*.
 Patotara (Lyll). *Cyathodes acerosa*.
 Patotara (Colenso). *Botrychium ternatum*.
 Patutiketike (Elsdon Best). *Coprosma grandifolia* and *C. lucida*.
 Pau (Williams). Cultivated variety of *Solanum tuberosum*.
 Pauaatahu (Colenso). Cultivated variety of *Ipomœa batatas*.
 Pehiakura (Williams). *Dicksonia squarrosa*. Erroneously spelled by Lindsay as Oehiakuri, and inserted in that form in the "Handbook."
 Pehu (Colenso). Cultivated variety of *Ipomœa batatas*.
 Pehu (Williams). Cultivated variety of *Colocasia antiquorum*.
 Pekapeka (Lyll). *Erechtites quadridentata*.
 Peka-a-waka (Elsdon Best). *Earina mucronata*.
 Pekepeke (Williams). *Celmisia longifolia*.
 Peoi (Williams). *Solanum aviculare*.
 Pepepe (Williams). *Cladium Sinclairii*.
 Pepepe (Elsdon Best). *Dianella intermedia*.
 Pere (Colenso). *Alseuosmia Banksii*.
 Pehia (Williams). *Deyeuxia Forsteri*.
 Perei (Colenso). *Gastrodia Cunninghamii*.
 Peretao (Elsdon Best). *Lomaria Patersoni*.
 Peretao (Elsdon Best). *Asplenium falcatum*.
 Petako (Elsdon Best). *Asplenium falcatum*.
 Petipeti (Elsdon Best). *Lomaria discolor*.
 Piamanuka (Colenso). Manna-like exudation of *Leptospermum scoparium*.
 Piho (Williams). Cultivated variety of *Solanum tuberosum*.
 Pikiarero (Colenso). *Clematis hexasepala* and *C. indivisa*.
 Pikirangi (Tregear). *Loranthus sp.*
 Pikoko (Williams). A variety of *Phormium tenax*.
 Pinakitere (Lindsay). *Geranium dissectum*.
 Pinakitere (Williams). *Ligusticum sp.*

- Pinatoro (Williams). *Pimelea lœvigata*.
 Pingao (Colenso, Williams). *Scirpus frondosus*.
 Piopio (Williams). *Dianella intermedia*.
 Pipiko (Elsdon Best). *Aspidium Richardi*.
 Pipiko-kauhanga-roa (Williams). Cultivated variety of *Ipomœa batatas*.
 Pirikahu (Colenso, Williams). *Acœna sanguisorbœ*.
 Pirinoa (Williams). *Loranthus* sp.
 Piripiri (Colenso, Williams). *Acœna sanguisorbœ*.
 Piripiri (Cunningham, Williams). *Haloragis tetragyna* and *H. micrantha*.
 Piripiri (Colenso). *Bulbophyllum pygmœum*.
 Piripiri (Williams, Elsdon Best). *Hymenophyllum polyanthos* and *H. demissum*.
 Piripiriwhata (Cunningham, Williams). *Carpodetus serratus*.
 Pirita (Colenso, Williams). *Rhipogonum scandens*.
 Pirita (Colenso). *Tupeia antarctica*.
 Piriwhetau (Williams). *Acœna sanguisorbœ*.
 Pitau (Lindsay, H. C. Field). *Cyathea medullaris*.
 Piupiu (Colenso). *Polypodium pennigerum*.
 Piupiu (Williams). *Lomaria procera*.
 Piupiu (H. C. Field). *Lomaria discolor*.
 Poananga (Williams). *Clematis hexasepala*.
 Poataniwha (Elsdon Best). *Melicope simplex*.
 Pohata (Williams). *Brassica campestris*.
 Pohue (Colenso). *Calystegia sepium*.
 Pohuehue (Williams). *Muhlenbeckia complexa*.
 Pohuehue (Hector). *Passiflora tetrandra*.
 Pohutukawa (Yate, Cunningham, Colenso). *Metrosideros tomentosa*.
 Pohutukawa (Colenso). *Asplenium flaccidum*.
 Pohutukawa (Colenso). Cultivated variety of *Ipomœa batatas*.
 Poipapa (E. B. Dickson). *Chenopodium triandrum*.
 Pokaka (Colenso, Williams). *Elœocarpus Hookerianus*. In some districts also applied to *E. dentatus*.
 Pokere } (Williams). Fruit of *Beilschmiedia Tawc*.
 Pokerehu }
 Pokerekahu (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Pokopokonuihauru. *Clematis parviflora*.
 Ponga (Colenso, Williams, &c.). *Cyathea dealbata*.
 Pongi (Colenso, Williams). Cultivated variety of *Colocasia antiquorum*.
 Poniu (Williams). *Nasturtium palustre*.
 Popihui (Hector). *Libertia pulchella*.
 Popohui (Hector). *Arthropodium cirrhatum*.
 Popopo (E. B. Dickson). *Solanum aviculare*.
 Poporo (Williams). *Solanum aviculare* and *S. nigrum*.
 Poporokaiwhiri (Williams). *Hedycarya dentata*.
 Poranga (Colenso). Cultivated variety of *Ipomœa batatas*.
 Porerarua (Williams). *Erigeron canadensis*.
 Porokaiwhiria (Colenso). *Hedycarya dentata*.
 Poroporo (Cunningham, Colenso, Williams, &c.). *Solanum aviculare* and *S. nigrum*.
 Poroporo-tanguru (Williams). *Solanum aviculare*.
 Pororua (Colenso, Williams). *Sonchus oleraceus*.
 Potaetae (Williams). *Clematis hexasepala*.
 Potango (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Potango (Williams). A variety of *Phormium tenax*.
 Pou (Kirk). *Sideroxylon costatum*.
 Pouaka (Williams). *Festuca littoralis*.
 Pouhawaiki (Williams). *Erigeron canadensis*.
 Powhiwhi (R. H. Matthews). *Ipomœa palmata*.
 Powhiwhi (R. H. Matthews). *Calystegia tuguriorum*.

- Powhiwhi (E. B. Dickson). *Passiflora tetrandra*.
 Puahou (Elsdon Best). *Panax arboreum*.
 Puakaito (Elsdon Best). *Celmisia spectabilis*.
 Puakarimu (E. B. Dickson). *Lycopodium densum*.
 Pua-o-te-reinga (Rev. R. Taylor). *Dactylanthus Taylori*.
 Puarangitoto (Williams). *Senecio perdicoides*.
 Puareinga (Rev. R. Taylor). *Dactylanthus Taylori*.
 Puarere (Tregear). *Spinifex hirsutus*.
 Puatahoe (Williams). Cultivated variety of *Ipomœa batatas*.
 Puatataua (E. B. Dickson). *Clematis hexasepala*.
 Puataua (Percy Smith). *Clematis hexasepala*.
 Puatautaua (Williams). *Clematis hexasepala*.
 Puatawhiwhi (Williams). *Metrosideros florida*.
 Puatea (Williams). *Gnaphalium keriense*.
 Puatea (E. B. Dickson). *Craspedia fimbriata*.
 Puawananga (Colenso, Lindsay, &c.). *Clematis indivisa*. Sometimes spelled Puawhananga.
 Puharetaiko (Kirk). *Celmisia spectabilis*.
 Puheretaiko (Lyll, Traill). *Senecio rotundifolius*.
 Puhikawa. *Drimys axillaris*.
 Puhou (Lyll, Williams). *Coriaria ruscifolia*.
 Puka (Colenso). *Meryta Sinclairii*.
 Puka (Colenso, Williams). *Griselinia lucida*.
 Puka (Elsdon Best). *Eugenia maire*.
 Puka (Cunningham, Colenso, Williams). *Muhlenbeckia australis*.
 Pukapuka (Colenso, Williams). *Brachyglottis repanda*.
 Pukariao (Tregear). *Paratrophis heterophylla*.
 Pukariao (Hector). *Brachyglottis repanda*.
 Pukatea (Colenso, Williams, &c.). *Laurelia novæ-zelandiæ*.
 Pukurau (Williams). *Ileodictyon cibarium*.
 Punawaru (Williams). *Siegesbeckia orientalis*.
 Punaweta (Traill). *Carpodetus serratus*.
 Pungapunga (Colenso, Williams). Pollen of *Typha angustifolia*.
 Puniu (Elsdon Best). *Todea superba*.
 Puniu (Williams). *Aspidium aculeatum*.
 Punui (Williams). *Aralia Lyallii*.
 Punui (Colenso). *Cyathea Cunninghamii*.
 Punuiarata (Williams). Cultivated variety of *Ipomœa batatas*.
 Purata (Colenso). Cultivated variety of *Ipomœa batatas*.
 Purekireki (Williams). *Carex teretiuscula*.
 Puriri (Yate, Polack, Cunningham, &c.). *Vitex lucens*.
 Putaputaweta (Williams). *Carpodetus serratus*.
 Puwatawata (Elsdon Best). *Enargea marginata*.
 Puwha (Colenso). *Sonchus oleraceus*.
 Puwharawhara (Williams). *Astelia Banksii*.
 Puwharetaiko (Williams). *Senecio rotundifolius*.
 Puwhaureroa (Williams). *Senecio latifolius*.
 Puwhaureroa (Williams). *Pisonia Brunoniana*.
 Rahurahu (Lindsay, Williams). *Pteris aquilina*.
 Ramarama (Cunningham, Colenso, &c.). *Myrtus bullata*.
 Ramarama (Williams). *Drimys colorata*.
 Rangiora (Colenso, Williams). *Brachyglottis Rangiora*.
 Raoriki (Williams). *Ranunculus macropus*.
 Raparaparuru (Williams). A variety of *Solanum tuberosum*.
 Rape (Williams). A variety of *Solanum tuberosum*.
 Rarahū } (Williams). *Pteris aquilina*.
 Rarauhe }
 Rata (Yate, Polack, Cunningham, &c.). *Metrosideros robusta*.

- Rata (Lyll). *Metrosideros lucida*.
 Rata (Lyll). *Metrosideros florida*.
 Ratapiki (Cunningham). *Metrosideros florida*.
 Rataroa (Elsdon Best). Variety of *Phormium tenax*.
 Rauaruhe (Williams). *Pteris aquilina*.
 Rauhuia (Colenso). *Linum monogynum*.
 Raukatauri (Elsdon Best). *Asplenium flaccidum*.
 Raukawa (Colenso). *Panax Edgerleyi*.
 Raukumara (Williams). *Senecio perdicoides*.
 Raumanga (E. B. Dickson). *Polypodium Billardieri*.
 Raumataki (Colenso). Cultivated variety of *Ipomœa batatas*.
 Raumoa (Tregear). *Spinifex hirsutus*.
 Raupeka (Elsdon Best). *Earina suaveolens*.
 Raupeti (Colenso, Williams). *Solanum nigrum*.
 Raupo (Polack, Colenso, Williams). *Typha angustifolia*.
 Raurakau (Williams). *Brachyglottis repanda*.
 Raurakau (Williams). *Coprosma grandifolia*.
 Rauraua (Edgerley). *Panax Edgerleyi*.
 Raurekau (Williams). *Coprosma grandifolia*.
 Raurenga (Williams). *Trichomanes reniforme*.
 Rauriki (Williams). *Sonchus oleraceus*.
 Rauroroa (Williams). *Sonchus asper*.
 Rautahi (Colenso). *Carex ternaria*.
 Rautawhiri (Williams). *Pittosporum tenuifolium* and *P. Colensoi*.
 Rautini (G. Mair). *Senecio Huntii*.
 Rauwiri (Cunningham). *Leptospermum ericoides*.
 Renga (Williams). Rhizome of *Pteris aquilina*.
 Rengarenga (Yate, Colenso, Williams). *Arthropodium cirrhatum*.
 Rengarenga (Williams). *Tetragonia expansa*.
 Repehina (Williams). *Deyeuxia Forsteri*.
 Repehina-papa (Elsdon Best). *Arthropodium candidum*.
 Rerehapa (Williams). A variety of *Phormium tenax*.
 Rereti (Elsdon Best). *Lomaria lanceolata*.
 Rerewai (Williams). *Potamogeton natans* and *P. Cheesemanii*.
 Retoreto (Williams). *Azolla rubra*.
 Rewarewa (Yate, Polack, Cunningham). *Knightia excelsa*.
 Rimu (Yate, Polack, Cunningham). *Dacrydium cupressinum*.
 Rimu (Bidwill). *Dacrydium laxifolium*.
 Rimurapa (Williams). *D'Urvillœa utilis*.
 Ririwaka (Colenso, Williams). *Scirpus maritimus*.
 Riwai (Williams). A general name for *Solanum tuberosum*.
 Rohutu (Colenso, Williams). *Myrtus pedunculata* and *M. obcordata*.
 Roi (Colenso, Williams). Rhizome of *Pteris aquilina*.
 Rokeroke (Williams). Cultivated variety of *Solanum tuberosum*.
 Rongotainui (Williams). A variety of *Phormium tenax*.
 Ronui (Colenso). *Brachycome odorata*.
 Ropi (Williams). Cultivated variety of *Solanum tuberosum*.
 Rororo (Williams). *Olea montana*.
 Rukutia (Williams). A variety of *Phormium tenax*.
 Runa (Williams). *Rumex flexuosus*.
 Runa (Cunningham). *Plagianthus divaricatus*.
 Rutitira (F. A. D. Cox). *Cyathodes robusta*.
 Taeaka (Williams). Cultivated variety of *Solanum tuberosum*.
 Taewa (Williams). A general name for *Solanum tuberosum*.
 Tahanui (Williams). Cultivated variety of *Cordyline*.
 Tahune (Williams). Downy seeds of *Typha*.
 Taiawa (Williams). A general name for *Solanum tuberosum*.
 Taikura (Williams). Heart-wood of timber trees.
 Tainui (Hector, Williams). *Pomaderris apetala*.

- Taitea (Williams). Sap-wood of timber trees.
 Takaka (Williams). *Pteris aquilina*.
 Takaka (Percy Smith). *Melicope ternata*.
 Takatakapo (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Takirikau (Williams). Applied to strong-fibred varieties of *Phormium tenax*.
 Tamingi (Hector). *Epacris pauciflora*.
 Tamure (Williams). A variety of *Phormium tenax*.
 Tanæ (Williams). Cultivated variety of *Colocasia antiquorum*.
 Taneawai (Williams). A variety of *Phormium tenax* with bronzy foliage.
 Tanehurangi (Williams). Cultivated variety of *Ipomœa batatas*.
 Tanekaha (Yate, Cunningham, Colenso, &c.). *Phyllocladus trichomanoides*.
 Tangeao (Colenso, Williams). *Litsæa calycaris*.
 Tangeo (Williams). *Litsæa calycaris*.
 Tanguru (Williams). *Olearia furfuracea*.
 Tapairu (Williams, Elsdon Best). *Senecio Kirkii*.
 Tapatapauma (Williams). *Griselinia littoralis*.
 Tapatapauma (Williams). *Coprosma grandifolia*.
 Tapia (Elsdon Best). *Tupeia antarctica*.
 Tapoto (Williams). Applied to strong-fibred varieties of *Phormium tenax*.
 Taputini (Colenso). Cultivated variety of *Ipomœa batatas*.
 Tapuwaekotuku (Williams). *Gleichenia Cunninghamii*.
 Taraheke (Williams). *Rubus australis*.
 Taraire (Polack, Cunningham, Colenso, &c.). *Beilschmiedia Tarairi*.
 Taramaui (Williams). *Panax* sp.
 Taramea (Colenso, Williams). *Aciphylla Colensoi*.
 Taramoa (Colenso). *Rubus australis*.
 Taranga (Williams). *Pimelea longifolia*.
 Tarangarara (Williams). *Gahnia lacera*.
 Taranui (Williams). *Paspalum scrobiculatum*.
 Tarata (Colenso, Williams). *Pittosporum eugenioides*.
 Taratamata (Williams). Cultivated variety of *Ipomœa batatas*.
 Tarawera (Percy Smith). *Pteris tremula*.
 Tarikupenga (Tregear). *Lygodium articulatum*.
 Taringa-o-Tiakiwai (Williams). The fungus *Hirneola polytricha*.
 Taro (Cunningham, Colenso, &c.). *Colocasia antiquorum*.
 Taro-hoia (Colenso, Williams). A recently introduced variety of *Colocasia antiquorum*.
 Taroa (Williams). Variety of *Phormium tenax*.
 Tarutaru (Williams). A general name for grasses, especially the smaller species.
 Tatairongo (Williams). Cultivated variety of *Solanum tuberosum*.
 Tataka (Mantell). *Melicope ternata*.
 Tatarahake (Colenso). *Coprosma acerosa*.
 Tatarahake (Cunningham, Colenso, &c.). *Rubus australis*.
 Tataramoa-turuhunga (Elsdon Best). *Rubus australis*.
 Tauhinu (Colenso, Williams). *Pomaderris phyllicæfolia*.
 Tauhinu (Hector). *Podocarpus nivalis*.
 Tauhinu-korokio (Williams). *Cassinia leptophylla*.
 Tauhinu-koromiko (Williams). *Cassinia leptophylla*.
 Tauparapara (Elsdon Best). *Panax arboreum*.
 Taupata (Percy Smith). *Coprosma Baueri*.
 Taupunga (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Tautamahei (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Tawa (Yate, Cunningham, Colenso, &c.). *Beilschmiedia Tawa*.
 Tawai (Bidwill, Colenso, Williams). *Fagus fusca* and *F. Menziesii*.
 Tawairauriki (Hector). *Fagus Solandri*.
 Tawaiwai (Lindsay, Williams). *Phyllocladus trichomanoides*.
 Tawao (Williams). *Carmichaelia* sp.
 Tawapou (Colenso, Williams). *Sideroxylon costatum*.
 Tawari (Colenso, Williams). *Ixerba brexioides*.

- Taweke (Williams). *Sonchus asper*.
 Taweku (Lindsay, Williams). *Coriaria ruscifolia*.
 Tawhai (Colenso, Williams). *Fagus Menziesii* and *F. Solandri*.
 Tawhairaunui (Colenso). *Fagus fusca*.
 Tawhairauriki (Colenso). *Fagus Solandri*.
 Tawhara (Colenso, Williams). Flowers of *Freycinetia Banksii*.
 Tawhero (Lyll, Colenso, Williams). *Weinmannia sylvicola* and *W. racemosa*.
 Tawhewheo (Williams, Elsdon Best). *Quintinia serrata*.
 Tawhiri (Williams). *Pittosporum tenuifolium*.
 Tawhirikaro (Lindsay). *Pittosporum cornifolium*.
 Tawhiwhi (Colenso). *Pittosporum tenuifolium*.
 Tawiniwini (Elsdon Best). *Gaultheria antipoda*.
 Tete (Williams). *Todea superba*.
 Teteaweke (Traill, Williams). *Olearia angustifolia*.
 Tetererea (Williams). Cultivated variety of *Ipomœa batatas*.
 Teure (Williams). Fruit of *Freycinetia Banksii*.
 Ti (Colenso, &c.). A general name for all the species of *Cordyline*.
 Ti-kapu (Colenso, Williams). *Cordyline indivisa*.
 Ti-kapu (Elsdon Best). *Cordyline Banksii*.
 Ti-kauka (Williams). *Cordyline australis*.
 Ti-koraha (Colenso). *Cordyline pumilio*.
 Ti-kouka (Colenso, Williams). *Cordyline australis*.
 Ti-kupenga (Lindsay). *Cordyline pumilio*.
 Ti-mahonge (Williams). A subvariety of the Ti-para.
 Ti-matakutai (Williams). *Cordyline indivisa*.
 Ti-ngahere (Williams). *Cordyline Banksii*.
 Ti-para (Williams). *Cordyline* sp. Cultivated for the sugary root.
 Ti-parae (Hector). *Cordyline Banksii*.
 Ti-pore (Archdeacon Walsh). *Cordyline terminalis*.
 Ti-rakau (Hector). *Cordyline australis*.
 Ti-tahanui (Williams). A variety of the Ti-para.
 Ti-tawhiti (Hector). *Cordyline* sp.
 Ti-toi (Williams). *Cordyline indivisa*.
 Ti-tore (Williams). *Cordyline Banksii*.
 Ti-whanake (Williams). *Cordyline australis*.
 Tihore (Hector, Williams, &c.). A name applied to a variety of *Phormium tenax* with remarkably strong fibre.
 Tika (Williams). *Phormium tenax* (ordinary varieties).
 Tikumu (Colenso). *Celmisia coriacea*.
 Tio (Williams). *Dicksonia squarrosa*.
 Tipau (Colenso, Williams). *Myrsine Urvillei*.
 Tirori (Percy Smith). Fruit of *Freycinetia Banksii*.
 Titirangi (Lyll). *Veronica speciosa*.
 Titoki (Colenso, Williams). *Alectryon excelsum*.
 Titongi (Colenso, Williams). *Alectryon excelsum*.
 Toatoa (Colenso). *Phyllocladus trichomanoides* and *P. glauca*.
 Toatoa (D'Urville, Williams). *Haloragis alata*.
 Toetoe (Colenso, &c.). *Arundo conspicua*.
 Toetoe (Colenso, &c.). *Mariscus ustulatus*.
 Toetoe (Williams). A general name for large-leaved grasses and sedges.
 Toetoe-hunangamoho (Williams). *Danthonia Cunninghamii*.
 Toetoe-kakaho (Williams). *Arundo conspicua*.
 Toetoe-kiwi (Williams). *Gahnia lacera*.
 Toetoe-rautahi (Williams). *Carex ternaria*.
 Toetoe-tarangarara (Williams). *Gahnia lacera*.
 Toetoe-tuhara (Williams). *Cladium Sinclairii*.
 Toetoe-upokotangata (Williams). *Mariscus ustulatus*.
 Toetoe-whatumanu (Lyll, Williams). *Mariscus ustulatus*.

- Toheraoa (Williams). *Deyeuxia Forsteri*.
 Toi (Colenso). *Barbarea vulgaris*.
 Toii (Colenso, &c.). *Cordyline indivisa*.
 Toikahikatea (Colenso). Cultivated variety of *Ipomœa batatas*.
 Toittoi (Colenso). Cultivated variety of *Ipomœa batatas*.
 Tokitoki (Williams). *Alectryon excelsum*.
 Tokotokohau (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Tongitongi (Williams). *Alectryon excelsum*.
 Topitopi (Mantell). *Alectryon excelsum*.
 Toro (Colenso, Williams). *Persoonia Toru*.
 Toro (Williams). *Myrsine salicina*.
 Toroamahoe (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Toroheke (Williams). *Pimelea arenaria*.
 Toromiro (Colenso, Williams). *Podocarpus ferrugineus*.
 Toropapa (J. Adams). *Alseuosmia macrophylla*.
 Toropapa (Eldson Best). *Alseuosmia quercifolia*.
 Toroputa (Percy Smith). *Gaultheria sp.*
 Torotoro (Lindsay, Williams). *Metrosideros scandens*.
 Torowhenua (Colenso). Cultivated variety of *Ipomœa batatas*.
 Toru (Colenso). *Persoonia Toru*.
 Totara (Yate, Polack, Cunningham). *Podocarpus totara*.
 Totara (Lindsay). *Cyathodes acerosa*.
 Totara (Colenso, Williams). *Leucopogon Fraseri*.
 Totara-kiri-kotukutuku (Mantell). *Libocedrus Doniana*.
 Totoroene (Eldson Best). *Parsonsia capsularis*.
 Totorowhiti (Williams). *Dracophyllum strictum*.
 Towai (Cunningham, Williams, &c.). *Weinmannia sylvicola* and *W. racemosa*.
 Towai (Raoul). *Paratrophis heterophylla*.
 Tuakura (Lindsay, Williams). *Dicksonia squarrosa*.
 Tuanui (Williams). A variety of *Podocarpus totara*.
 Tuhara (Williams). *Cladium Sinclairii*.
 Tukauki (Williams). *Libertia ixioides*.
 Tukirunga (Colenso). *Dicksonia fibrosa*.
 Tukorehu (Lindsay, Williams). *Plantago sp.*
 Tukou (Colenso). Cultivated variety of *Ipomœa batatas*.
 Tumatakuri (Colenso). *Discaria Toumatou*.
 Tumatakuru (Eldson Best). *Aciphylla squarrosa*.
 Tumatakuru (Colenso, Williams). *Discaria Toumatou*.
 Tumingi (Williams). *Leucopogon fasciculatus*.
 Tumingi (Lyall). *Cyathodes acerosa*.
 Tuokura (Eldson Best). *Dicksonia squarrosa*.
 Tupakihi (Polack, Cunningham, Colenso). *Coriaria ruscifolia*.
 Tupare (Traill, Williams). *Olearia Colensoi*.
 Tupari (Hector). *Olearia operina* and *O. Lyallii*.
 Tupari (Percy Smith). *Lomaria procera*.
 Tuputupu (Polack). *Avicennia officinalis*.
 Turawera (Colenso). *Pteris tremula*.
 Turepo (Williams). *Paratrophis heterophylla*.
 Turikakoa (Williams). *Spinifex hirsutus*.
 Turikoka (Williams). *Deyeuxia Forsteri*.
 Turitaka (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Turutu (Lindsay, Williams). *Dianella intermedia*.
 Turutu (Lyall). *Libertia ixioides*.
 Tutaekamoana (Williams). *Tetragonia expansa*.
 Tutaekaaahu (E. B. Dickson). *Oxalis magellanica*.
 Tutaekiore (E. B. Dickson). *Euphrasia cuneata*.
 Tutaekoau (Williams). *Apium australe*.
 Tutaetara (Colenso). Cultivated variety of *Ipomœa batatas*.

- Tutahuna (Elsdon Best). *Raoulia tenuicaulis*.
 Tutanga (Williams). Cultivated variety of *Ipomœa batatas*.
 Tutoke (Elsdon Best). *Aspidium Richardi*.
 Tutu (Lyll, Lindsay, Williams). *Coriaria ruscifolia*.
 Tutuhanga (Colenso). Cultivated variety of *Ipomœa batatas*.
 Tutuheuheu (Mantell). *Coriaria thymifolia*.
 Tutukiwi (Elsdon Best). *Pterostylis Banksii*.
 Tutumako (Williams). *Euphrasia cuneata*.
 Tutunawai (Colenso, Williams). *Polygonum serrulatum*.
 Tutupapa (Colenso, Williams). *Coriaria thymifolia*.
- Upokotangata (Colenso). *Mariscus ustulatus*.
 Upokotiketike (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Ureure (Colenso, Williams). Fruit of *Freycinetia Banksii*.
 Ururangi (Williams). Cultivated variety of *Ipomœa batatas*.
 Uwhi (Williams). Variety of *Solanum tuberosum*.
 Uwhikaho (Williams). *Dioscorea* sp.
 Uwhipara (Tregear). *Marattia fraxinea*.
- Waekahu (Lindsay). *Lycopodium volubile*.
 Waekahu (Williams). *Muhlenbeckia complexa*.
 Waekura (Elsdon Best). *Gleichenia Cunninghamii*.
 Waeruru (Williams). Cultivated variety of *Solanum tuberosum*.
 Waewaekaka (Colenso, Williams). *Gleichenia circinata*.
 Waewaekoukou (Colenso, Williams). *Lycopodium volubile*.
 Waewaekoukou (R. H. Matthews). *Lycopodium densum*.
 Waewaematuku (Colenso). *Gleichenia circinata*.
 Waiha (Williams). Cultivated variety of *Ipomœa batatas*.
 Waina (Williams). Cultivated variety of *Ipomœa batatas*.
 Wairuaarangi (Colenso). Cultivated variety of *Colocasia antiquorum*.
 Waiuatua (Colenso). *Euphorbia glauca*.
 Waiuatua (Williams). *Rhabdothermus Solandri*.
 Waiuatua (Williams). *Gaultheria oppositifolia*.
 Waiuokahukura (Williams). *Euphorbia glauca*.
 Waniwani (Colenso, Williams). Cultivated variety of *Ipomœa batatas*.
 Waoriki (Elsdon Best). *Ranunculus rivularis*.
 Wawaupaku (Colenso). *Panax anomalum*. More correctly Whauwhaupaku.
 Wekeweke (Williams). *Sonchus asper*.
 Weki (Colenso). *Dicksonia squarrosa*. Same as Wheki, which is a more common spelling.
 Wenewene (Williams). Cultivated variety of *Lagenaria vulgaris*.
 Weni (Williams). Cultivated variety of *Ipomœa batatas*.
 Whakakumu (Colenso). Cultivated variety of *Ipomœa batatas*.
 Whakapiopio (Lindsay, Williams). *Metrosideros scandens*.
 Whakatangitangi (Lindsay, Williams). *Metrosideros florida*.
 Whakatata (Tregear). *Corokia buddleoides*.
 Whakatata (F. A. D. Cox). *Corokia macrocarpa*.
 Whakou (Elsdon Best). Flowers of *Ixerba brexioides*.
 Whanake (Williams). *Cordyline australis*.
 Whangai-rangatira (Percy Smith). Cultivated variety of *Lagenaria vulgaris*.
 Wharangi (Colenso, Williams). *Melicope ternata*.
 Wharangipiro (Lyll). *Olearia Cunninghamii*.
 Wharangipiro (Williams). *Olearia furfuracea*.
 Wharangipiro (Colenso). *Melicope ternata*.
 Wharangitawhito (Tregear). *Brachyglottis repanda*.
 Wharanui (Williams). Variety of *Phormium tenax*.
 Wharariki (Williams). *Phormium Cookianum*.
 Wharawhara (Williams). *Astelia Banksii*.

- Wharengarara (Williams). *Pimelea laevigata*.
 Wharewareatua (Williams). *Pittosporum cornifolium*.
 Whau (Cunningham, Colenso, &c.). *Entelea arborescens*.
 Whaupaku (Williams). *Panax arboreum*.
 Whauwhau (Lindsay). *Gaya Lyallii*.
 Whauwhau (Cunningham). *Pseudopanax Lessonii*.
 Whauwhau (Williams). *Panax arboreum*.
 Whauwhaupaku (Colenso). *Panax arboreum*.
 Whauwhi (Colenso, Williams). *Hoheria populnea*.
 Whauwhi (Hector). *Plagianthus betulinus*.
 Whauwhi (Lyall). *Gaya Lyallii*.
 Whawhakou (Hector). *Eugenia maire*.
 Whe (Williams). *Hemitelia Smithii*.
 Wheki (Williams). *Dicksonia squarrosa*.
 Whelikohunga (Williams). *Dicksonia fibrosa*.
 Whekiponga (Colenso, Williams). *Dicksonia fibrosa*.
 Wheterau (Williams). *Ileodictyon cibarium*.
 Whinau (Williams). *Elæocarpus dentatus*.
 Whinaupuka (Elsdon Best). *Elæocarpus Hookerianus*.
 Whiri-o-Raukatauri (Elsdon Best). *Asplenium flaccidum*.
 Whiri-o-Raukatauri (Elsdon Best). *Lycopodium Billardieri*.
 Whitaui (Mantell, Williams). Dressed fibre of *Phormium*.
 Wi (Colenso, &c.). *Juncus effusus* and other species.
 Wi (Williams). *Poa caespitosa*.
 Wiwi (Colenso, Williams). *Juncus effusus* and *J. maritimus*.
 Wiwi (Lyall). *Scirpus nodosus*.
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IV. GLOSSARY.

- ABERRANT.** Deviating from the established rule or type.
- ABNORMAL.** Contrary to rule; deviating from the usual structure.
- ABORTION.** Suppression or imperfect development of any part.
- ABORTIVE.** Imperfectly developed, as in the case of stamens which do not bear anthers.
- ABRUPT.** Terminating suddenly as if the end were cut or broken off.
- ABRUPTLY ACUMINATE.** Ending in a point arising from a broad extremity.
- ABRUPTLY PINNATE.** Applied to a pinnate leaf when it ends with a pair of leaflets.
- ACAULESCENT.** Stemless, or without a conspicuous stem.
- ACCRESCENT.** Enlarging in size with age, as the calyx of some plants after the flowering period.
- ACCUMBENT.** Lying against another body; applied to cotyledons when their edges are placed against or pointing towards the radicle.
- ACEROSE.** Needle-shaped; as the leaves of true pines.
- ACHENE.** A small hard and dry indehiscent 1-celled and 1-seeded fruit.
- ACHLAMYDEOUS.** Having neither calyx nor corolla; destitute of perianth.
- ACICULAR.** Needle- or bristle-shaped; rather more slender than acerose.
- ACINACIFORM.** Scimitar-shaped.
- ACOTYLEDON.** A plant destitute of cotyledons or seed-lobes; Cryptogams.
- ACULEATE.** Furnished with prickles or sharp points, as the stem of a rose.
- ACUMINATE.** Tapering to a gradually diminishing point.
- ACUTE.** Sharply pointed but not drawn out; also applied to any organ having a sharp edge or margin.
- ADHERENT.** Union of dissimilar parts, as when the calyx-tube is joined to the ovary.
- ADNATE.** Attached by the whole length; as when anthers have their lobes attached along their whole length to the filament, or when stipules adhere by their whole length to the petiole.
- ADRESSED.** See APPRESSED.
- ADVENTITIOUS.** Of accidental or abnormal occurrence, as when roots are produced from the stem or branches.
- ÆSTIVATION.** The manner in which the parts of a flower are arranged or folded while in bud.
- AFOLIATE.** Having no leaves.
- AGGREGATED.** Crowded together, but not actually coherent.
- ALATE.** Winged, or having expansions like wings; as sometimes on a stem or petiole, or on the fruit or seeds.
- ALBUMEN.** The nutritive matter stored within the seed and usually surrounding the embryo.
- ALBUMINOUS.** Applied to seeds containing albumen.
- ALLIACEOUS.** Possessing the smell of garlic or onions.
- ALPINE.** Applied to plants peculiar to high altitudes above the limits of forest growth.
- ALTERNATE.** (1.) Applied to leaves when they follow one another at intervals on opposite sides of the stem; not opposite. (2.) Also used with respect to the different parts of the flower, as when stamens are alternate with petals—that is, intermediate to them, not opposite.
- ALVEOLATE.** Marked like honey-comb; deeply and closely pitted.
- AMORPHOUS.** Without regular or definite form; shapeless.

- AMPHIBIOUS. Growing equally well in water or on dry land.
- AMPHITROPAL, AMPHITROPOUS. Applied to the ovule when it is curved so that both ends are brought near together.
- AMPLEXICAUL. Applied to leaves or stipules when the base is dilated and embraces the stem.
- ANASTOMOSING. When one vein unites with another, the union forming a reticulation or network.
- ANATROPAL, ANATROPOUS. When the ovule is reversed or bent back so that the micropyle is close to the hilum and the chalaza at the other end.
- ANDRŒCEIUM. The male system of a flower; the stamens collectively.
- ANDROGYNOUS. Having both male and female flowers in the same inflorescence, as in many species of *Carex*.
- ANEMOPHILOUS. Flowers which are fertilised through the agency of the wind, the pollen being conveyed through the air.
- ANGIOSPERMS, ANGIOSPERMÆ. Plants having their ovules enclosed in an ovary.
- ANNUAL. Applied to plants which grow up and perish in one season.
- ANNULAR. Ring-shaped.
- ANNULATE. Furnished with rings or belts.
- ANNULUS. In ferns, applied to an elastic ring which partially or wholly surrounds the sporangium and ruptures it at maturity.
- ANTERIOR. Placed in front, or turned away from the axis.
- ANTHER. That portion of a stamen which contains the pollen.
- ANTHERIDIUM. The male sexual organ in Cryptogams, answering to the anther in Phanerogams.
- ANTHEROZOIDS. Motile cells provided with cilia, produced within an antheridium; also called "spermatozooids."
- ANTHESIS. The period of expansion of a flower.
- ANTICOUS. Remote, or turned away from the axis.
- APETALOUS. Having no corolla or inner perianth.
- APEX. The tip or summit of any organ.
- APHYLLOUS. Not possessing leaves.
- APICAL. At the apex or summit.
- APICULATE. Abruptly ending in a short and sharp point.
- APOCARPOUS. Applied to a flower in which the carpels or ovaries are separate.
- APPENDAGE. Something added or attached to an organ, but not an essential part of it.
- APPENDICULATE. Furnished with appendages.
- APPRESSED. Lying flat or pressed close for the whole length, as hairs to the surface of a leaf.
- AQUATIC. Living in water.
- ARACHNOID. Resembling a spider's web.
- ARBORESCENT. Resembling a tree in size and mode of growth.
- ARCHEGONIUM. The female sexual organ in Cryptogams, containing the oosphere, which after fertilisation develops into the sporophyte.
- ARCULATE. Curved or bent like a bow.
- AREOLE. A small area or space marked out on any surface; a small interstice or cavity; a space in any reticulated surface.
- AREOLATE. Marked with areoles; divided into distinct spaces or meshes.
- AREOLATION. A system of reticulated markings.
- ARIL, ARILLUS. An expansion of the funicle, more or less enveloping the seed.
- ARILLATE. Provided with an aril.
- ARISTATE. Awned; provided with a bristle-like point.
- ARTICULATED. Jointed; separated into distinct members or joints.
- ASCENDING. Rising somewhat obliquely; not quite erect.
- ASPEROUS. Rough; harsh to the touch.
- ATTENUATE. Tapering gradually; drawn out.
- AURICLE. A small ear-like lobe or appendage at the base of a leaf.
- AURICULATE. Provided with auricles.

AWL-SHAPED. Shaped like the point of an awl; narrow and tapering to a point.
AWN. A bristle-like terminal or dorsal appendage, especially common on the glumes of grasses.

AWNED. Having awns.

AXIL, AXILLA. The angle contained between the axis and any organ arising from it, as a leaf.

AXILE. Belonging to the axis or situated in it, as axile placentation.

AXILLARY. Growing in an axil.

AXIS. The central line of a body in the direction of its length; the stem.

BACCATE. Berried; having the form or nature of a berry.

BARB. Hooked hairs.

BARBATE. Bearded; provided with long weak hairs arranged in tufts.

BARBED. Furnished with barbs or hooked hairs.

BARBELLATE. Provided with short stiff hairs.

BARK. The outer covering or integument of the wood exterior to the cambium layer.

BASAL. At the base of any organ or part.

BASIFIXED. Attached by the base or lower end.

BASILAR. Basal.

BEAK. A prolonged tip.

BEAKED. Ending in a beak; often applied to fruits which end in a long point.

BERRY. A succulent or pulpy fruit containing many seeds.

BI- or BIS-. A Latin prefix signifying two or twice—as bibracteate, having two bracts; bidentate, with two teeth.

BIENNIAL. A plant which lives only two years.

BIFARIOUS. Arranged in two opposite rows or ranks; distichous.

BIFID. Two-cleft; divided halfway into two.

BILABiate. Divided into lips, as is the case with many gamopetalous corollas.

BILOCULAR. Two-celled.

BINATE. Applied to leaves composed of two leaflets at the end of a common petiole, or to a single leaf almost divided into two.

BIPARTITE. Divided nearly to the base into two parts.

BIPINNATE. Twice pinnate; when both the primary and secondary divisions of a leaf are pinnate.

BISERRATE. Doubly serrate, as when the serratures themselves are serrate.

BITERNATE. Twice ternate.

BLADE. The expanded portion of a leaf.

BRACT. A modified leaf subtending a flower or a cluster of flowers; modified leaves placed in the space between the calyx and the true leaves.

BRACTEATE. Furnished with bracts.

BRACTEOLE. A secondary bract upon the pedicel of a flower; a small bract.

BRACTEOLATE. Furnished with bracteoles.

BRANCH. A division of the stem or main axis.

BRANCHLET. A small branch; the ultimate division of a branch.

BRISTLE. A stiff hair.

BRISTLE-POINTED. Ending in a stiff, bristle-like hair.

BUD. The early stage of a flower or branch.

BULB. A rounded subterranean body formed of fleshy scales or coatings; in reality a modified bud which ultimately develops leaves and flowers.

BULBOUS. Having bulbs, or possessing the structure of a bulb.

BULLATE. Blistered or puckered, as the leaf of *Myrtus bullata*.

CADUCOUS. Falling away early; not at all persistent.

CÆSPITOSE. Growing in tufts somewhat in the same way as grass.

CALCARATE. Provided with a spur.

CALLOSITY. A thickened and hardened swelling on the surface of any organ.

- CALLUS.** (1.) Any abnormally thickened part. (2.) In grasses, applied to a swelling or extension of the flowering glumes at their insertion on the axis or rhachilla of the spikelet.
- CALYCINE.** Pertaining to or resembling a calyx.
- CALYCLULATE.** Having a whorl of bracts outside the true calyx and resembling it.
- CALYPTRATE.** Hood-like, or bearing a hood or cap.
- CALYX.** The outer series of floral envelopes.
- CAMPANULATE.** Bell-shaped.
- CAMPYLOTROPAL, CAMPYLOTROPOUS.** Applied to an ovule when one end has grown faster than the other, so as to cause the apex (or micropyle) to curve inwards and approach the hilum.
- CANALICULATE.** Having a longitudinal groove or channel.
- CAPILLARY.** Very slender and hair-like.
- CAPITATE.** (1.) Having a rounded head. (2.) Growing in heads, as the flowers of *Compositæ*.
- CAPITELLATE.** The diminutive of "capitate."
- CAPSULE.** A dry many-seeded seed-vessel, splitting into valves.
- CAPSLAR.** Having fruit of the nature of a capsule.
- CARINA.** The name applied to the keel, or the two cohering anterior petals of a papilionaceous flower.
- CARINATE.** Keeled.
- CARPEL.** A simple pistil, or that element of a compound pistil which answers to a single leaf.
- CARPOPHORE.** A portion of the axis or receptacle elongated between the carpels and protruding beyond them, as in *Geranium* and many *Umbelliferae*.
- CARTILAGINOUS.** Firm and tough; resembling cartilage.
- CARUNCLE.** A wart or prominence near the base or hilum of a seed.
- CARUNCULATE.** Having a caruncle.
- CARYOPSIS.** A small one-celled and one-seeded fruit with a thin, closely adherent pericarp; the fruit of grasses.
- CATKIN.** A deciduous spike consisting of unisexual apetalous flowers.
- CAUDATE.** Tailed; drawn out into a tail-like appendage.
- CAUDEX.** The axis of a plant, consisting of the stem and root; the stem of a palm or tree-fern.
- CAUDICLE.** In orchids, applied to the slender often strap-shaped body connecting the pollen-masses with the rostellum.
- CAULINE.** On or belonging to the stem; frequently applied to leaves growing on the stem, as opposed to those springing from near the root.
- CELL.** (1.) An independent portion of protoplasm, bounded by a wall of cellulose, and containing a nucleus; the unit of all cellular structure. (2.) A cavity or separate enclosure, as of an ovary or anther.
- CELLULAR.** Composed of minute cells.
- CENTRIFUGAL.** Applied to an inflorescence which develops from the centre outwards, as the cyme.
- CENTRIPETAL.** Applied to an inflorescence which develops from the margin towards the centre, or from the base towards the summit, as the corymb, raceme, &c.
- CERNUOUS.** Nodding, but hardly pendulous.
- CHANNELLED.** Having a longitudinal groove like a gutter.
- CHARTACEOUS.** Papery; having the texture of paper.
- CHLOROPHYLL.** The green colouring matter within the cells of plants.
- CILIATE.** Having the margin (and sometimes the nerves) fringed with hairs.
- CILIOLATE.** Fringed with minute hairs.
- CINEREOUS.** Ashy-grey.
- CIRCINATE.** Coiled from the tip into a spiral, as the young fronds of ferns.
- CIRCUMSCISSILE.** Opening by a transverse circular line.
- CIRRHATE, CIRRHOSE.** Bearing tendrils.
- CLADODE.** A flattened branch simulating a leaf.

- CLAVATE. Club-shaped ; growing gradually thicker towards the top.
- CLAW. The elongated narrow base of a petal.
- CLEISTOGAMIC. Producing flowers which never expand, and which are self-fertilised.
- COHERENT. The union of one part of an organ with other parts of the same organ, as when petals cohere to form a tubular corolla, &c.
- COLLATERAL. Placed side by side.
- COLUMN. A body formed by the union of the stamens and styles, as in orchids.
- COMMISSURE. The face by which two carpels cohere, as in the *Umbelliferae*.
- COMPLICATE. Folded upon itself.
- COMPRESSED. Flattened laterally.
- CONCAVE. Hollow, as the inner surface of a saucer.
- CONDUPPLICATE. Folded together lengthwise.
- CONFLUENT. Blended or running together.
- CONGESTED. Crowded together.
- CONGLOBATE. Collected into a ball or globe.
- CONICAL. Cone-shaped ; narrowed to a point from a circular base.
- CONNATE. When related parts are united, either congenitally or by subsequent growth.
- CONNECTIVE. That portion of a stamen which connects the two lobes of an anther.
- CONNIVENT. Coming into contact ; converging together.
- CONSTRICED. Drawn together ; contracted.
- CORTORTED. Twisted.
- CONTRACTED. Reduced in width or length.
- CONVEX. Having a more or less rounded surface ; opposed to "concave."
- CONVOLUTE. Rolled together or on itself, or when one part is rolled up in another.
- CORDATE. Heart-shaped ; applied to leaves which have the petiole at the broader and notched end.
- CORICEOUS. Tough, leathery.
- COROLLA. The inner perianth, consisting of the petals, free or united.
- COROLLINE. (1.) Seated on or belonging to the corolla. (2.) Corolla-like or petaloid.
- CORYMB. A flat-topped or convex open inflorescence with a short axis, flowering from the margin inwards.
- CORYMBOSE. Arranged in corymbs or resembling a corymb.
- COSTA. A rib ; when one only, a midrib or mid-nerve.
- COSTATE. Ribbed ; having one or more longitudinal ribs or nerves.
- COTYLEDON. The first leaves of the embryo—one in monocotyledons, two or rarely more in dicotyledons.
- CRENATE. Applied to a leaf having its margin cut into rounded notches.
- CRENULATE. Finely crenate.
- CRESTED. Having an elevated ridge or appendage like the crest of a helmet.
- CRISPED. Curled ; crumpled.
- CRUSTACEOUS. Hard and brittle in texture.
- CRYPTOGAM, CRYPTOGRAMOUS. Plants destitute of stamens, pistils, and true seeds containing an embryo.
- CUCULATE. Hooded or hood-shaped.
- CULM. The hollow jointed stem of grasses.
- CUNEATE. Wedge-shaped ; triangular with the apex downwards.
- CUSP. A sharp rigid point.
- CUSPIDATE. Terminating in a cusp.
- CUTICLE. The outermost skin or epidermis.
- CYATHIFORM. Shaped like a drinking-glass a little widened at the top.
- CYME. A broad and rather flat open inflorescence, flowering from the centre outwards.

- DECANDROUS.** Having ten stamens.
- DECIDUOUS.** Falling off after a time ; not persistent.
- DECLINATE.** Bent or curved downwards.
- DECOMPOUND.** Repeatedly compound or divided.
- DECUMBENT.** Reclining or horizontal at the base, but ascending at the summit.
- DECURRENT.** Running downwards ; applied to a leaf prolonged below its point of insertion.
- DECUSSATE.** In pairs crossing alternately at right angles, as the leaves in many species of *Veronica*.
- DEFINITE.** (1.) Of a constant number, not exceeding twenty. (2.) Limited or determinate, as definite inflorescence, where the axis ends in a flower.
- DEFLEXED.** Bent abruptly downwards.
- DEHISCENCE.** The manner in which a fruit-capsule or anther-cell opens at maturity.
- DEHISCENT.** Opening or splitting into definite parts.
- DELTOID.** Shaped like the Greek letter Δ ; broadly triangular.
- DENDROID.** Resembling a tree in shape or mode of branching.
- DENTATE.** Toothed ; possessing regular teeth pointing straight outwards.
- DENTICULATE.** Finely toothed.
- DEPAUPERATE.** Reduced in size, as if starved or impoverished.
- DEPENDENT.** Hanging down.
- DEPRESSED.** Flattened from above.
- DEXTROSE.** Towards the right hand.
- DIADELPHOUS.** Having the stamens united in two bundles.
- DIANDROUS.** Possessing two stamens.
- DIAPHANOUS.** Allowing light to pass through ; pellucid.
- DICHLAMYDEOUS.** Applied to those plants whose flowers have a double perianth, or both calyx and corolla.
- DICHTOMOUS.** Repeatedly forked by pairs.
- DICOTYLEDONS.** Those plants whose embryo possesses two cotyledons or seed-lobes.
- DIDYMOUS.** In pairs or deeply divided into two lobes.
- DIDYNAMOUS.** Having four stamens placed in pairs, two long and two short.
- DIFFUSE.** Loosely or widely spreading.
- DIGITATE.** Fingered ; applied to a compound leaf in which the leaflets spread from the top of the petiole.
- DILATED.** Widened ; expanded.
- DIMIDIATE.** Halved ; as when half of a leaf is so much smaller than the other as to appear wanting.
- DIMORPHIC, DIMORPHOUS.** Occurring in two forms.
- DIGECIOUS.** Unisexual ; having the male and female flowers on different plants.
- DIPETALOUS.** Having two petals.
- DIPHYLLOUS.** Possessing two leaves.
- DISC.** (1.) A dilation or development of the receptacle within the calyx or within the corolla and stamens. (2.) The central portion of the flower-head of a Composite, as opposed to the ray. (3) The face of any organ, in contradistinction to the margin.
- DISCIFORM.** Having the shape of a disc—circular and depressed.
- DISCOIDAL.** Same as “disciform.”
- DISSECTED.** Deeply divided or cut into many segments.
- DISSEPIMENT.** The partitions separating the cells of an ovary or fruit.
- DISTICHOUS.** Arranged in two vertical rows or ranks, as the florets of many grasses.
- DISTINCT.** Separate ; not united.
- DIVARICATE.** Widely spreading.
- DIVERGENT.** Spreading further apart ; the opposite of “convergent.”
- DIVIDED.** Cleft almost to the base.
- DORSAL.** On or relating to the back of any organ.

- DORSIFIXED. Attached by or on the back.
- DOTTED. Marked with transparent receptacles of oil, looking like dots.
- DRUPACEOUS. Resembling or of the nature of a drupe.
- DRIPE. A fleshy or succulent fruit, such as the plum, which has the seed enclosed in a hard and bony putamen or casing; often called a "stone-fruit."
- EBRACTEATE. Having no bracts.
- ECHINATE. Beset with prickles, like the capsule of *Entelea*.
- ECOSTATE. Having no ribs.
- EDENTATE. Having no teeth.
- EFFUSE. Loosely spreading.
- EGLANDULAR. Without glands.
- ELLIPSOIDAL. A solid with an elliptical outline.
- ELLIPTICAL. Having the form of an ellipse—oblong with regularly rounded ends.
- ELONGATED. Drawn out in length.
- EMARGINATE. Having a notch at the end, as if a piece had been taken out.
- EMBRYO. The rudimentary plant formed within the seed.
- ENDEMIC. Confined to a particular country or region.
- ENDOCARP. The inner layer of the pericarp, lying next the seed.
- ENDOSPERM. The albumen or nutritive matter of a seed, usually surrounding the embryo.
- ENSIFORM. Sword-shaped, like the leaf of an Iris.
- ENTIRE. Having an even margin, without toothed or division of any kind.
- EPHEMERAL. Lasting for a day, or for a very short time.
- EPICARP. The external layer of a pericarp.
- EPICOROLLINE. Inserted upon the corolla.
- EPIDERMIS. The outer cellular skin or covering of a plant.
- EPIDERMAL. On or relating to the outer covering.
- EPIGYNOUS. At or upon the top of the ovary.
- EPIPETALOUS. Inserted upon the petals.
- EPIPHYTE. A plant which grows upon other plants, but not as a parasite.
- EQUITANT. Folded over as if astride, like the basal part of the leaves of *Phor-mium*.
- ERECT. Upright; perpendicular to the ground or point of attachment.
- ERECTO-PATENT. Intermediate between erect and spreading.
- EROSE. Toothed in an irregular manner, as if gnawed.
- EROSTATE. Having no beak.
- EVEN. Without inequalities of surface.
- EXALBUMINOUS. Having no albumen; applied to those seeds where the embryo occupies the whole space within the testa.
- EXCURRENT. When the vein of a leaf runs through to the apex and protrudes beyond it as a mucro.
- EXOTIC. Foreign; not native.
- EXPANDED. Spread out.
- EXsertED. Protruding beyond, as stamens beyond the corolla.
- EXTIPULATE. Wanting stipules.
- EXTORSE. Directed outwards; often applied to the dehiscence of anthers.
- FALCATE. Sickle-shaped; strongly curved.
- FARINACEOUS. Mealy; containing or having the texture of flour or starch, as the albumen of wheat.
- FARINOSE. Covered with a white mealy substance.
- FASCICLE. A small bundle or close cluster.
- FASCICLED. Arranged in a fascicle.
- FASTIGIATE. Applied to a plant when the branches are close together, parallel, and erect, as in the Lombardy Poplar.

- FEATHERY.** Plumose; having long hairs which are themselves hairy, as the pappus of *Taraxacum*.
- FENESTRATE.** Pierced with holes, like windows in a wall.
- FERRUGINOUS.** Rust-coloured.
- FERTILE.** Capable of producing fruit; also applied to stamens which produce pollen capable of fertilising ovules.
- FIBROUS.** Containing a great proportion of woody fibre.
- FILAMENT.** (1.) The stalk or support of an anther. (2.) Any thread-like body.
- FILAMENTOUS.** Composed of threads or filaments.
- FILIFORM.** Thread-shaped.
- FIMBRIATE.** Having the margin fringed with narrow processes.
- FISTULAR, FISTULOSE.** Hollow and cylindrical; reed-like.
- FLABELLATE, FLABELLIFORM.** Fan-shaped.
- FLACCID.** Flabby; limp.
- FLAGELLIFORM.** Long and slender, like a whip-lash.
- FLEXUOSE.** Bent or curved alternately in opposite directions.
- FLOCCOSE.** Bearing tufts or locks of woolly hairs.
- FLORET.** A small flower, one of a cluster or head.
- FLORIFEROUS.** Flower-bearing.
- FŒTID.** Having a strong and disagreeable smell.
- FOLIACEOUS.** Having the texture or form of a leaf.
- FOLIATE.** Leafy; clothed with leaves.
- FOLIOLATE.** Having leaflets.
- FOLLICLE.** A fruit consisting of a single carpel, dehiscing by the ventral suture.
- FOLLICULAR.** Resembling a follicle.
- FOOD-STALK.** A petiole, pedicel, or other slender support.
- FORKED.** Branching into two divergent divisions.
- FOVEATE.** Pitted; marked with depressions.
- FROND.** The foliage of ferns and other Cryptogams.
- FRUCTIFICATION.** Fruiting; the organs concerned in the production of fruit.
- FRUTICOSE.** Shrubby.
- FUGACIOUS.** Soon falling off or perishing; of short duration.
- FULVOUS.** Tawny; dull-yellow with a mixture of gray or brown.
- FUNICLE.** The stalk connecting the ovule or seed with the placenta.
- FURCATE.** Forked; having divergent branches like the prongs of a fork.
- FURFURACEOUS.** Scurfy; provided with soft scales.
- FUSIFORM.** Thick, but tapering towards each end; spindle-shaped.
- GALEA.** A petal shaped like a helmet.
- GAMOPETALOUS.** Applied to a corolla in which the petals are more or less united.
- GAMOSEPALOUS.** Having the sepals more or less united.
- GEMINATE.** Arranged in pairs; binate.
- GENERIC.** Relating to the genus.
- GENICULATE.** Bent like the knee.
- GENUS.** A clearly defined group of naturally allied species.
- GIBBOUS.** Protuberant; swelling out into a pouch or sac.
- GLABROUS.** Having no hairs or pubescence; smooth.
- GLABRATE.** Becoming glabrous.
- GLABRESCENT.** Almost glabrous.
- GLADIATE.** Sword-shaped; ensiform.
- GLAND.** Any secreting structure, whether depressed or prominent, on any part of a plant.
- GLANDULAR.** Possessing glands; gland-like.
- GLAUCESCENT.** Becoming glaucous or sea-green.
- GLAUCOUS.** Of a sea-green colour.
- GLOBOSE, GLOBULAR.** Spherical or nearly so.
- GLOCHIDIATE.** Applied to hairs that are barbed at the end.

GLOMERATE. Arranged in compact clusters.

GLOMERULE. A compact and somewhat capitate cluster of flowers; a small and densely compacted cyme.

GLUMACEOUS. Resembling the glumes of grasses.

GLUME. The term applied to the chaff-like and usually distichous bracts of the inflorescence of grasses and allied plants.

GLUTINOUS. Covered with a sticky secretion.

GRAIN. The fruit of grasses; a caryopsis.

GRANULAR, GRANULOSE. Composed of small grains or rough with small grains.

GYMNOSPERMS. Plants in which the ovule is not enclosed in an ovary, as in the *Coniferae*.

GYNÆCEUM. The pistil or pistils of a flower; the female portion of a flower.

GYNANDROUS. Having the stamens adnate to the pistil, as in Orchids.

GYNOPHORE. The stalk or support of the ovary.

GYRATE. Curved into a circle or spiral; circinate.

HABIT. The general appearance of a plant.

HABITAT. (1.) The kind of locality in which a plant grows. (2.) The geographical distribution or range of a plant.

HAIR. A slender outgrowth of the epidermis, either composed of a single elongated cell or of a row of cells.

HAIRY. More or less covered with hairs.

HALOPHYTE. A plant growing within the influence of salt water.

HASTATE. Halbert-shaped; applied to an arrow-shaped leaf with the basal lobes pointing straight outwards.

HELICOID. Coiled into a circle like the whorls of a small shell.

HERB. A plant that has no persistent woody stem.

HERBACEOUS. Having the character of a herb; not woody or shrubby.

HERMAPHRODITE. Having stamens and pistils in the same flower.

HETEROGAMOUS. Bearing two kinds of flowers, as in the *Compositæ*, where the florets of the disc may be hermaphrodite and those of the ray unisexual or neuter.

HETEROGENEOUS. Dissimilar; not uniform in kind.

HETEROMORPHOUS. Of two or more different forms.

HETEROPHYLLOUS. Having leaves of different forms.

HETEROSPOROUS. Having spores of more than one kind.

HILUM. The scar or place of attachment of the seed.

HIRSUTE. Hairy with long tolerably distinct hairs.

HISPID. Beset with rough hairs or bristles.

HISPIDULOUS. Minutely hispid.

HOARY. Greyish-white with a fine pubescence.

HOMOGAMOUS. Having only one kind of flowers; applied to the flower-heads of *Compositæ* when the florets are all alike.

HOMOGENEOUS. Alike, uniform in kind; the opposite of "heterogeneous."

HYALINE. Translucent; colourless.

HYBRID. A cross between two species, obtained when the pollen of one species is placed upon the stigma of the other.

HYPOCRATERIFORM. Applied to a corolla which has a long and slender tube and flat spreading limb, like the Primrose.

IMBRICATE, IMBRICATED. Overlapping, as the tiles on a roof; or, in æstivation, overlapping at the edge only.

IMMARGINATE. Not margined or bordered.

IMPARIPINNATE. Pinnate with an odd terminal leaflet.

INCISED. Having the margin sharply and irregularly cut.

INCLUDED. Not projecting beyond the surrounding organ; the opposite of "exserted."

- INCOMPLETE. Not perfect; wanting some of its parts.
- INCRASSATE. Thickened.
- INCUMBENT. Resting or leaning upon; applied to the embryo when the radicle is folded down upon the back of the cotyledons.
- INCURVED. Bent inwards.
- INDEFINITE. (1.) Variable in number or very numerous, not easily counted. (2.) An inflorescence not definitely terminated, but continuous with the axis, the lower or marginal flowers being the first to open.
- INDEHISCENT. Not opening regularly by valves or otherwise.
- INDIGENOUS. Native to the country; not introduced.
- INDUMENTUM. Any covering, such as hairiness, &c.
- INDUPLICATE. Having the margins folded inwards.
- INDURATED. Hardened.
- INDUSIUM. (1.) In ferns, an outgrowth of the epidermis covering the sorus. (2.) A cup-shaped membrane or ring of collecting hairs below the stigma, usually well developed in the *Goodeniaceae*.
- INDUSIATE. Possessing an indusium.
- INFERIOR. Growing below some other organ, as an inferior calyx grows below the ovary, or an inferior ovary appears to grow below the adnate calyx.
- INFLATED. Swollen; bladdery.
- INFLEXED. Bent abruptly inwards.
- INFLORESCENCE. (1.) The flowering portion of a plant. (2.) The manner in which the flowers are arranged on the floral axis.
- INFUNDIBULIFORM. Funnel-shaped.
- INNATE. Borne on the apex of a support, as an anther fixed on the apex of a filament.
- INSERTED. Attached to or growing upon.
- INSERTION. The place or mode of attachment of an organ.
- INTERNODE. That part of a stem between the nodes.
- INTERPETIOLAR. Between the petioles; also applied to the coalesced stipules of two opposite leaves.
- INTORSE. Turned towards the axis; often applied to anthers which open towards the centre of the flower.
- INVOLUCEL. An inner or secondary involucre; that which surrounds a secondary or partial umbel.
- INVOLUCellate. Having a secondary involucre.
- INVOLUCRATE. Having an involucre.
- INVOLUCRE. A ring of bracts surrounding several flowers, as in the heads of *Compositæ* or the umbels of *Umbelliferae*; also sometimes applied to the indusium of ferns.
- INVOLUTE. Having the margins rolled inwards.
- IRREGULAR. Not regular; unsymmetrical.
- ISOMEROUS. Equal in number; applied to flowers having an equal number of parts in the successive whorls, as of sepals, petals, stamens, &c.
- KEEL. (1.) A central dorsal ridge resembling the keel of a boat. (2.) The two cohering anterior petals of a papilionaceous flower.
- LABELLUM. The third petal of an orchid, by a twist of the ovary placed in front of the flower, and usually very different in form from the remainder.
- LABIATE. Lipped; applied to an irregular calyx or corolla which is unequally divided into two parts or lips.
- LACERATE. Irregularly torn or cleft.
- LACINIATE. Cut into narrow slender teeth or lobes.
- LACTESCENT. Yielding milky juice.
- LACUNOSE. When the surface is covered with depressions or perforated with holes.
- LACUSTRINE. Inhabiting lakes or ponds.

- LAMELLA. A thin plate or scale.
- LAMELLAR, LAMELLATE. Composed of thin plates, or furnished with them.
- LAMINA. The blade or dilated portion of a leaf.
- LANATE. Clothed with woolly hairs.
- LANCEOLATE. Shaped like a lance-head; tapering upwards from a narrow ovate base.
- LANUGINOUS. Clothed with long woolly or cottony hairs.
- LATERAL. At the side; fixed on or near the side.
- LAX. Loose, distant.
- LEGUME. The seed-vessel of *Leguminosæ*; a one-celled and two-valved capsule, of very various form.
- LEGUMINOUS. Pertaining to or bearing legumes; belonging to the order *Leguminales*.
- LENTICEL. Lenticular corky spots on young bark, corresponding to epidermal stomata.
- LENTICULAR. Lens-shaped.
- LENTIGINOUS. Covered with minute dots or freckles.
- LEPIDOTE. Covered with small scurfy scales.
- LIGULE. (1.) A strap-shaped body, as the limb of the corolla in the florets of *Compositæ*. (2.) The thin scarious appendage at the junction of the leaf-blade with the sheath in grasses.
- LIGULATE. Furnished with a ligule; strap-shaped.
- LIMB. (1.) The expanded and usually spreading part of a gamopetalous corolla, as distinct from the tube. (2.) The lamina of a petal or leaf.
- LINEAR. Narrow and elongated, with parallel margins.
- LINEATE. Marked with lines.
- LINEOLATE. Marked with fine lines.
- LINGUIFORM, LINGULATE. Tongue-shaped.
- LIP. (1.) Either of the two divisions of a bilabiate corolla or calyx. (2.) The labellum of orchids.
- LITTORAL. Growing near the sea-shore.
- LOBE. Any division of a leaf, corolla, &c., especially if rounded.
- LOBE, LOBATE. Divided into or bearing lobes.
- LOBULE. A small lobe.
- LOBULATE. Having small lobes.
- LOCULATE. Divided into secondary cells or compartments.
- LOCULICIDAL. When the cells of a capsule open along the back between the septa, or by the dorsal suture.
- LODICULE. A name applied to the minute hyaline scales just outside the stamens in the flowers of grasses.
- LORATE. Strap-shaped; thong-shaped.
- LUCID. Having a shining surface.
- LUNATE. Half-moon shaped.
- LURID. Of a dingy brown or yellow.
- LUTESCENT. Yellowish.
- LYRATE. Lyre-shaped; pinnatifid with the terminal lobe large and rounded, the lower lobes small.
- MACROSPORANGIUM. A sporangium containing macrospores.
- MACROSPORE. The larger kind of spore in vascular cryptogams.
- MACULATE. Spotted or blotched.
- MALE. A plant or flower which possesses stamens.
- MAMMILLA. A nipple or teat-shaped projection.
- MAMMILLATE. Having nipple-shaped projections.
- MARCESCENT. Withering and persistent.
- MARGINAL. Placed upon or belonging to the edge or margin.
- MARGINATE, MARGINED. Furnished with an edge or border of a different character to the rest of the organ.

- MARITIME.** Belonging to the sea or the neighbourhood of the sea.
- MASSULA.** A group of microspores contained in a special envelope, as in *Azolla*.
- MEMBRANOUS, MEMBRANACEOUS.** Thin, soft, and translucent, like a membrane.
- MERICARP.** A name applied to one of the two carpels composing the fruit of *Umbelliferae*.
- MESOCARP.** The middle layer of a fruit or pericarp.
- MICROPYLE.** The opening or mark in the integument of a seed indicating the position of the foramen of the ovule.
- MICROSPORE.** The smaller kind of spore in vascular cryptogams.
- MIDRIB.** The central and principal nerve of a leaf.
- MONADELPHOUS.** Having the stamens all united by their filaments into a column or tube.
- MONANDROUS.** Having a single stamen.
- MONILIFORM.** Resembling a necklace or string of beads; constricted at regular intervals.
- MONOCHLAMYDEOUS.** Applied to those plants whose flowers have only a single perianth.
- MONOCOTYLEDONS.** Those plants whose embryo has but one cotyledon or seed-lobe.
- MONECIOUS.** Having the stamens and pistils in separate flowers, but borne on the same plant.
- MONOPETALOUS.** Gamopetalous; having all the petals united by their edges.
- MONOPHYLLOUS.** (1.) One-leaved, as an involucre composed of a single piece. (2.) Equivalent to "gamosepalous" or "gamopetalous."
- MONOTYPIC.** Applied to a genus with but one species.
- MUCILAGINOUS.** Composed of mucilage; slimy.
- MUCRO.** A sharp terminal point.
- MUCRONATE.** Possessing a short and sharp terminal point.
- MUCRONULATE.** Ending in a diminutive mucro.
- MULTIFARIOUS.** Arranged in many vertical rows or ranks.
- MULTIFID.** Cleft into many lobes or segments.
- MURICATE, MURICATED.** Rough with short hard points.
- MURICULATE.** Diminutive of "muricate"; minutely muricate.
- MUTICOUS.** Blunt; without a point.
- NAKED.** Bare; without its usual covering or appendages, as a stem without leaves, a flower without perianth.
- NAVICULAR.** Boat-shaped.
- NECTAR.** The sweet secretion within a flower; honey.
- NECTARIFEROUS.** Honey-bearing.
- NERVE.** A simple or unbranched vein or slender rib.
- NERVED.** Having nerves or slender ribs.
- NETTED.** Reticulated; net-veined.
- NODE.** That part of a stem or branch from which leaves or branches are given off; the knots in the stems of grasses.
- NODOSE.** Knotty or knobby; usually applied to roots.
- NUT.** A hard indehiscent one-celled fruit.
- NUTLET.** A small nut; sometimes applied to the hard seed-like divisions of the fruit of *Labiatae*.
- OBCONIC.** Shaped like an inverted cone.
- OBCORDATE.** Inversely heart-shaped, the notch being uppermost.
- OBLIQUE.** (1.) Unequal-sided. (2.) Slanting; turned to one side.
- OBLONG.** Considerably longer than broad, with parallel sides and rounded ends.
- OBOVATE.** Inversely ovate, the broadest part towards the apex.
- OBOVOID.** A solid with an obovate outline.
- OBSOLETE.** Wanting or imperfectly developed.

- OBTUSE.** Blunt or rounded at the end.
- OCELLATE, OCULATE.** Having circular patches of colour like eyes.
- OCHREACEOUS.** Ochre-colour; light-yellow with a tinge of red.
- OCHREATE, OCREATE.** Provided with an ochrea, a tubular stipule sheathing the stem, as in many *Polygonaceæ*.
- OLIGANDROUS.** Having few stamens.
- OPPOSITE.** Standing against or facing each other, as leaves when two spring from the same node, or when a stamen stands in front of a petal.
- ORBICULAR.** Applied to a leaf or other body having a circular outline.
- ORDER.** A group of plants above the genus in rank, and containing several or many closely allied genera.
- ORGAN.** Any definite part of a plant, as a cell, a leaf, a flower, &c.
- ORTHOTROPOUS, ORTHOTROPAL.** Applied to an ovule with a straight axis, the chalaza being at the point of insertion, and the micropyle at the opposite end.
- OSSEOUS.** Bony.
- OVARY.** The lower swollen part of the pistil, containing the ovules.
- OVATE.** Shaped like the longitudinal section of an egg, the broadest part being towards the base.
- OVoid.** A solid with the shape of an egg.
- OVULATE.** Possessing ovules.
- OVULE.** The young seed in the ovary; an organ which after fertilisation develops into the seed.
- OVULIFEROUS.** Bearing ovules.
- PALATE.** A projection within the throat of an irregular gamopetalous corolla; the prominent lower lip of a bilabiate corolla.
- PALEA.** (1.) The innermost bract or glume in grasses. (2.) The chaffy scales mixed with the florets on the receptacle of many *Compositæ*.
- PALEACEOUS.** Chaffy or furnished with chaff-like scales.
- PALMATE.** Lobed or divided so that the divisions radiate from the summit of the petiole.
- PALMATIFID.** Cut in a palmate manner almost as far as the petiole.
- PANDURIFORM.** Fiddle-shaped.
- PANICLE.** A loose irregularly branched inflorescence usually containing many flowers; a branched raceme or corymb.
- PANICLED, PANICULATE.** After the manner of a panicle; bearing a panicle.
- PAPILIONACEOUS.** Butterfly-like; applied to the irregular pea-like flowers characteristic of the suborder *Papilionaceæ* of the *Leguminosæ*
- PAPILLA.** A soft superficial gland or protuberance.
- PAPILLOSE.** Covered with papillæ.
- PAPPIFORM.** Resembling pappus.
- PAPPUS.** The hairs, bristles, or scales crowning the achene in *Compositæ*, representing the calyx-limb.
- PAPYRACEOUS.** Having the texture of paper.
- PARASITE.** A plant growing upon another plant and deriving nourishment from it.
- PARASITIC.** Growing as a parasite.
- PARIETAL.** Borne on the walls or interior surface of an ovary; attached to the wall of any organ.
- PARTITE.** Cleft almost to the base.
- PARTIAL.** A secondary division, as a partial umbel; opposed to "primary" or "general."
- PARTITION.** An inner wall or dissepiment.
- PATENT.** Widely spreading.
- PATULOUS.** Slightly spreading.
- PECTINATE.** Applied to a pinnatifid leaf with very narrow segments like the teeth of a comb.

- PEDATE.** Palmately divided with the lateral divisions again two-cleft.
- PEDICEL.** The stalk supporting a single flower in a compound inflorescence.
- PEDICELLATE.** Borne on a pedicel.
- PEDUNCLE.** A general or primary flower-stalk, bearing one or many flowers.
- PEDUNCULATE.** Furnished with a peduncle.
- PELTATE.** Shield-shaped; flat and attached to its support by the centre of the lower surface.
- PENCILLED.** Marked with fine lines.
- PENDULOUS.** Hanging downwards.
- PENICILLATE.** Divided into a brush of fine hairs.
- PERENNIAL.** A plant that lives for several years.
- PERFECT.** Applied to flowers that have both stamens and pistil.
- PERFOLIATE.** Applied to leaves the base of which closes round the stem, which thus appears to pass through the leaf.
- PERIANTH.** The floral envelopes, either the calyx or corolla, or both.
- PERICARP.** The seed-vessel or ripened ovary.
- PERIGYNium.** The flask-shaped utricle of *Carex* and *Uncinia*, including the true fruit.
- PERIGYNOUS.** Inserted round the ovary, but more or less adnate to the perianth.
- PERSISTENT.** Not falling off; remaining attached to its support.
- PERSONATE.** Applied to a bilabiate corolla having a prominent palate almost or entirely closing the throat.
- PETAL.** One of the separate parts of a polypetalous corolla.
- PETALOID.** Having the colour and texture of a petal.
- PETIOLATE.** Possessing a petiole or footstalk.
- PETIOLE.** The foot-stalk of a leaf.
- PETIOLULE.** The foot-stalk or petiole of a leaflet, or separate division of a compound leaf.
- PHÆNOGAM, PHANEROGAM.** Applied to plants bearing manifest flowers, containing stamens or pistils, or both.
- PHYLLODE.** Applied to a petiole when it assumes the shape and functions of a leaf, as in many Australian species of *Acacia*.
- PHYLLOTAXIS.** The mode in which leaves are arranged on the stems or branches.
- PILIFEROUS.** Bearing hairs or tipped with hairs.
- PILOSE.** Furnished with rather long and soft distinct hairs.
- PINNA.** One of the primary divisions of a pinnate or compound leaf.
- PINNATE.** Applied to a compound leaf which has its leaflets arranged along both sides of a common rhachis or midrib.
- PINNATELY.** In a pinnate manner.
- PINNATIFID.** Pinnately cleft; applied to a leaf which is divided half-way to the midrib or more into lobes or segments placed somewhat similarly to the lateral divisions of a feather.
- PINNATISECT.** Pinnately divided down to the midrib or rhachis.
- PINNULE.** A secondary pinna—that is, one of the pinnate or ultimate divisions of a pinna.
- PISIFORM.** Resembling a pea in size and shape.
- PISTIL.** The female organ of flowering plants, consisting, when complete, of ovary, style, and stigma.
- PISTILLATE.** Applied to flowers having a pistil but no stamens; a female flower.
- PITTED.** Marked with small depressions or pits; punctate.
- PLACENTA.** That part of the ovary which bears the ovules or young seeds, often consisting of the margins of the carpellary leaves.
- PLANE.** Having a flat surface.
- PLANO-CONVEX.** Plane or flat on one side and convex on the other.
- PLICATE.** Folded lengthwise into plaits like those of a fan.
- PLUMOSE.** Plume-like; having fine hairs on each side like those of a feather, as in the pappus of some *Compositæ*.

POD. A dry, many-seeded, dehiscent fruit, usually of cruciferous or leguminous plants.

POLLEN. The fine powdery contents of the anther in flowering plants, by whose action when placed on the stigma the fertilisation of the ovules is accomplished.

POLLINATION. The placing of the pollen on the stigmatic surface of the pistil.

POLLINIUM. A mass of pollen-grains compacted together, as in *Orchideæ*.

POLYADELPHOUS. Having the stamens arranged in several bundles or sets.

POLYANDROUS. Applied to flowers which have many stamens in each flower.

POLYGAMOUS. Having both perfect and unisexual flowers on the same plant.

POLYGONOUS. Having many angles.

POLYMORPHOUS, POLYMORPHIC. Assuming many forms; variable in form or habit.

POLYPETALOUS. Having several distinct petals.

PORE. Any small aperture.

POSTERIOR. Next or towards the main axis; opposed to "anterior."

POSTICIOUS. On the posterior side; placed next the axis.

PRÆMORSE. Ending abruptly, as if bitten off.

PRICKLE. A small spine; an outgrowth of the bark.

PROCESS. Any projecting appendage.

PROCUMBENT. Lying along the ground.

PROLIFEROUS. Producing offshoots or buds capable of reproducing the plant.

PROSTRATE. Lying flat on the ground.

PROTANDROUS, PROTERANDROUS. Applied to flowers in which the anthers mature before the pistil of the same flower.

PROTEROGYNOUS. Applied to flowers in which the pistil matures before the stamens of the same flower.

PROTHALLIUM. In the higher cryptogams, a body produced by the germination of the spore, and bearing the sexual organs.

PRUINOSE. Covered with a waxy powdery secretion or bloom.

PUBERULOUS. Minutely downy or pubescent.

PUBESCENT. Covered with short and soft downy hairs.

PULVINATE. Cushion-shaped; growing in thick mats or cushions.

PUNCTATE. Marked with minute dots or depressions, or with internal translucent glands.

PUNCTIFORM. Like a point or dot; reduced to a mere point.

PUNGENT. Terminating in a sharp and rigid point.

PUTAMEN. The hardened endocarp of a drupaceous or stone-fruit.

PYRAMIDAL. Shaped like a pyramid.

PYRENE. A small nutlet; a small stone of a drupe or similar fruit.

PYRIFORM. Pear-shaped.

QUADRANGULAR. Having four angles or corners.

QUADRATE. Square in form.

QUADRIFARIOUS. Arranged in four vertical rows or ranks, as the leaves of many species of *Veronica*.

RACEME. An inflorescence having several pedicellate flowers arranged upon a prolonged axis, the lower flowers opening first.

RACEMOSE. Bearing racemes, or like a raceme.

RADIATE. (1.) Diverging from or arranged around a common centre. (2.) Bearing ray-florets, as in many *Compositæ*.

RADICAL. Arising from the root or base of the stem.

RAPHE, RHAPHE. The adherent funicle of an ovule, connecting the hilum with the chalaza.

RAY. (1.) One of the branches of an umbel. (2.) A term applied to the outer florets in the flower-heads of *Compositæ*, in those cases where they are distinct from those of the disc or centre.

- RECEPTACLE.** (1.) The more or less expanded or produced apex of the peduncle, upon which the floral envelopes, stamens, and pistil are inserted. (2.) The short conical or convex axis bearing the florets in the flower-heads of *Compositæ*.
- RECLINATE.** With an erect or ascending base, but with the upper portion turned or bent downwards.
- RECURVED.** Curved backwards or downwards.
- REDUPLICATE.** Doubled back; in æstivation applied when the margins are valvate and reflexed.
- REFLEXED.** Bent abruptly down or backwards.
- REGULAR.** Symmetrical or uniform in shape or structure.
- RENIFORM.** Kidney-shaped.
- REPAND.** With the margin slightly sinuate or wavy.
- REPLUM.** A frame-like placenta left by the falling of the valves in the dehiscence of the pods of some *Cruciferae* and *Leguminosæ*, &c.; particularly obvious in *Carmichaelia*.
- RETICULATE.** Provided with markings or venation resembling network.
- RETROSE.** Directed backwards or downwards.
- RETUSE.** Having a rounded apex with a shallow notch at the centre.
- REVOLUTE.** Having the margins or apex rolled backwards.
- RHACHILLA.** The axis of the spikelet in grasses.
- RHACHIS.** The axis of an inflorescence, or of a compound leaf or frond.
- RHIZOME.** A prostrate or underground rootstock or stem, giving out roots below, the apex progressively sending up leaves or stems, sometimes short and tuberous.
- RHOMBIC.** Obliquely four-sided.
- RHOMBOID, RHOMBOIDAL.** Approaching a rhombic outline; quadrangular with the sides oblique.
- RIB.** A primary or prominent nerve or vein.
- RIBBED.** Furnished with prominent ribs.
- RIGID.** Stiff and inflexible.
- RINGENT.** Gaping; as a labiate corolla with an open throat.
- ROSTELLATE.** Having a small beak; the diminutive of "rostrate."
- ROSTELLUM.** A viscid portion of the column in *Orchideæ*, answering to the abortive anterior lobe of the stigma.
- ROSTRATE.** Beaked; gradually narrowed into a rather long slender point.
- ROSULATE.** Collected into a rosette.
- ROTATE.** Wheel-shaped; applied to a gamopetalous corolla with a short tube and flat spreading limb.
- RUDIMENT.** Any imperfectly developed and functionally useless organ.
- RUFIOUS.** Reddish; pale-red mixed with brown.
- RUGOSE.** Wrinkled; covered with wrinkled lines or ridges.
- RUGULOSE.** Somewhat wrinkled.
- RUMINATED.** Having the appearance of being chewed, as the albumen of the nutmeg.
- RUNCINATE.** Applied to a pinnatifid leaf in which the lobes or segments point towards the base of the leaf.
- SACCATE.** Pouch-shaped; furnished with a sac or pouch-like cavity.
- SAGITTATE.** Shaped like the head of an arrow; triangular, with two basal lobes prolonged downwards.
- SARCOCARP.** The fleshy or succulent part of a drupe or stone-fruit.
- SARMENTOSE.** Producing long and flexible twigs or runners.
- SCABERULOUS.** Somewhat rough or scabrous.
- SCABRID.** Slightly rough.
- SCABROUS.** Rough to the touch; furnished with minute points or asperities.
- SCALE.** A name usually applied to variously modified bracts or depauperated leaves, thin and scarious or coriaceous or fleshy, often imbricated.

SCANDENT. Climbing.

SCAPE. A naked peduncle arising from the crown of the root, or from among the radical leaves.

SCAPIGEROUS. Bearing scapes.

SCARIOSE, SCARIOUS. Thin dry and membranous, not green.

SCORPIOID. Applied to a unilateral circinate coiled inflorescence, unrolling as the flowers expand.

SCROBICULATE. Marked by minute depressions.

SCUTELLATE. Shaped like a small platter.

SECUND. Turned or pointing to one side only.

SEED. The ripened ovule, consisting of the embryo and its proper envelopes.

SEGMENT. One of the divisions into which a leaf or other organ may be cleft or divided.

SEPAL. A name applied to each of the separate parts or divisions of a calyx.

SEPALOID. Resembling a sepal.

SEPTATE. Divided by partitions or septa.

SEPTICIDAL. When the cells of a capsule open through the dissepiments or lines of junction of the carpels.

SEPTIFRAGAL. When the valves of a capsule in dehiscence break away from the dissepiments.

SEPTUM. A partition dividing a cavity.

SERICEOUS. Silky; clothed with soft straight appressed hairs.

SERRATE. Applied to a leaf having its margin furnished with teeth like those of a saw.

SERRATURES. Teeth like those of a saw.

SERRULATE. Minutely serrate.

SESSILE. Sitting directly on the point of support without any intervening foot-stalk or petiole.

SETA. A bristle of any kind; a stiff hair.

SETACEOUS. Bristle-like.

SETIFORM. Having the shape of a bristle.

SETIGEROUS. Bearing bristles or furnished with bristles.

SETOSE. Beset with bristles.

SETULOSE. Provided with minute slender bristles.

SHEATH. A tubular envelope investing the stem, as the lower part of the leaf in grasses.

SILICULE. A short pod or siliqua, not much longer than broad.

SILIQUA. The pod-like fruit of the *Cruciferae*, having two valves falling away from a frame (replum) on which the seeds are placed.

SIMPLE. Of one piece; not compound.

SINUATE. Having a deep waved margin.

SINUS. An angular or rounded recess or depression separating lobes or segments.

SMOOTH. (1.) Having an even surface; not rough; opposed to "scabrous."
(2.) Glabrous or free from hairs; opposed to "pubescent."

SORUS. A cluster of sporangia in ferns.

SPADIX. A spike with a thickened fleshy rhachis and usually enclosed or subtended by a large bract or spathe, as in many Aroids.

SPARSE. Thinly scattered.

SPATHE. A large often coloured bract enclosing an inflorescence, usually a spadix.

SPATHULATE. Oblong, with the lower end much drawn out, so as to resemble a druggist's spatula.

SPECIES. A group of all those individuals possessing the same constant and distinctive characters.

SPICATE. Like a spike, or arranged in a spike.

SPIKE. An inflorescence having several or many sessile flowers arranged on a lengthened axis, the lower flowers opening first.

SPIKELET. In grasses and sedges, applied to a cluster or small spike of one or more flowers, usually subtended by a pair of glumes.

- SPINE.** A sharp woody or rigid outgrowth from the stem: a modified branch, leaf, or stipule.
- SPINESCENT.** Ending in a spine or sharp point.
- SPINOSE.** Furnished with or resembling spines.
- SPINULOSE.** Having small spines; the diminutive of "spinose."
- SPORANGIUM.** In the higher Cryptogams, the case or sac which contains the spores.
- SPORE.** In Cryptogams, a minute body or cell capable of germination, but not possessing an embryo as in a true seed.
- SPUR.** A slender tubular process from some part of a flower, often containing nectar.
- SQUAMATE, SQUAMOSE.** Furnished with scales; scaly or scale-like.
- SQUARROSE.** Rough with spreading projections or processes, as the tips of bracts.
- STAMEN.** The pollen-bearing organ of the flower, consisting of an anther usually borne on a filament or stalk.
- STAMINIFEROUS.** Stamen-bearing.
- STAMINODIUM.** A sterile or abortive stamen.
- STANDARD.** The broad upper petal of a papilionaceous flower.
- STELLATE.** Star-shaped; radiating from a centre like the points of a star.
- STEM.** The main ascending axis of a plant.
- STERILE.** Barren; applied to flowers wanting a pistil, or to stamens destitute of anthers or pollen.
- STIGMA.** That portion of the pistil which receives the pollen, usually situated at the tip of the style.
- STIGMATIC.** Relating to or belonging to the stigma.
- STIGMATOSE.** Provided with stigmas.
- STIPES.** (1.) The petiole or foot-stalk of the frond of a fern. (2.) The stalk or support of the gynæceum or carpel, or other organ.
- STIPELLA.** A secondary stipule, sometimes found at the base of the leaflets of compound leaves.
- STIPITATE.** Borne on a stalk or stipes.
- STIPULATE.** Provided with stipules.
- STIPULE.** Appendages of various kinds arising from the base of the petiole of a leaf.
- STOLON.** A horizontal sucker or runner from the base of a plant, usually rooting at the tip.
- STOLONIFEROUS.** Sending out stolons.
- STRIATE.** Marked with fine longitudinal lines.
- STRICT.** Upright and very straight.
- STRIGILLOSE.** Minutely strigose.
- STRIGOSE.** Covered with short, straight, stiff, and appressed sharp-pointed hairs.
- STROPHIOLATE.** Possessing strophioles.
- STROPHIOLE.** An appendage situated near the hilum of some seeds.
- STYLE.** The upper attenuated part of a pistil or carpel, bearing the stigma at its top. It is often very short or wanting.
- STYLIFORM.** Style-shaped; resembling a narrow cylinder.
- STYLOPODIUM.** A swollen expansion at the base of the style in the *Umbelliferae*.
- SUBULATE.** Awl-shaped.
- SUCCULENT.** Juicy and fleshy.
- SUFFRUTESCENT, SUFFRUTICOSE.** Slightly or somewhat shrubby; woody at the base.
- SULCATE.** Grooved or furrowed.
- SUPERIOR.** Growing or placed above. The calyx is said to be superior when it appears to spring from the top of the ovary; on the other hand, the ovary is superior when it is free from the calyx and is consequently placed above it.
- SUSPENDED.** Hanging directly downwards; hanging from the apex of a cell.

SUTURE. A junction or line of union or dehiscence.

SYMMETRICAL. Regular in its shape or in the number of its parts.

SYCARPOUS. Composed of two or more united carpels.

SYNONYM. A superseded or disused name.

TAIL. A long and slender terminal prolongation.

TEETH. Any small marginal or terminal lobes.

TENDRIL. A filiform coiled or twining process by which one plant clings to another.

TERETE. Cylindrical or nearly so, not angled or grooved.

TERNATE. Arranged in threes, as three in a whorl or cluster, or when three leaflets or segments start from the same point.

TESTA. The outer coat of the seed.

TETRADYNAMOUS. Having four long and two shorter stamens, as in the flowers of *Cruciferae*.

TETRAGONAL, TETRAGONOUS. Having four angles.

TETRAMEROUS. Composed of four parts or members.

TETRANDROUS. Having four stamens.

TETRAPTEROUS. Four-winged.

THALLOID. Resembling a thallus.

THALLUS. A vegetative body without distinction of stem or leaf.

THROAT. The orifice of a gamopetalous corolla or calyx: that portion of the corolla or calyx between the limb and the tube.

THRYSUS. A contracted or ovate panicle, broadest about the middle.

TOMENTOSE. Densely covered with matted wool or short hairs.

TOMENTUM. Densely matted woolly pubescence.

TOROSE. Cylindrical or nearly so, with constrictions at regular intervals.

TORTUOUS. Twisted or bent in different directions.

TORULOSE. The diminutive of "torose."

TORUS. The receptacle of a flower; the more or less modified apex of the peduncle, upon which the parts of the flower are inserted.

TRABECULATE. Furnished with markings like cross-bars

TRANSVERSE. Lying or placed across in a cross direction.

TRIANDROUS. Having three stamens.

TRIANGULAR. Three-angled; having the shape of a triangle.

TRICHOTOMOUS. Three-forked; branching into three divisions springing from one point.

TRIFID. Three-cleft.

TRIFOLIOLATE. Having three leaflets.

TRIFURCATE. Having three forks or branches.

TRIGONAL, TRIGONOUS. Three-angled, with flat faces.

TRIMORPHIC. Occurring in three forms.

TRIPARTITE. Divided to the base into three parts.

TRIPINNATE. Thrice pinnate; when the leaflets of a bipinnate leaf are again pinnate.

TRIPINNATIFID. Thrice pinnatifid.

TRIQUETROUS. Acutely three-angled with the faces concave.

TRUNCATE. Ending abruptly, as if cut off transversely.

TUBE. (1.) Any hollow elongated body or part of an organ. (2.) The lower united portion of a gamopetalous corolla or calyx.

TUBER. A short and thick subterranean branch or rhizome, furnished with scattered buds or "eyes," from which new shoots can arise.

TUBERCLE. A small projection or wart-like excrescence.

TUBERCULATE. Covered with small warts or excrescences.

TUBEROUS. Resembling a tuber.

TUBULAR. Tube-shaped; cylindrical and hollow.

TUMID. Swollen or inflated.

TUNICATE. Having several concentric coats or tunics, like an onion.

TURBINATE. Top-shaped.

TURGID. Swollen or distended.

TWINING. Climbing by twining or winding round a support.

TYPE. The ideal representative of a species or other division.

TYPE-SPECIMEN. The original specimen from which a description of a particular species was drawn up.

TYPICAL. That which corresponds with or represents the type.

UMBEL. An inflorescence in which several pedicels of about the same length radiate from the top of a common peduncle. An umbel is said to be simple when each of its pedicels or rays ends in a single flower; compound when each ray bears a secondary umbel.

UMBELLATE. Having the inflorescence arranged in umbels.

UMBELLULE. A secondary umbel.

UMBILICATE. Having a depression in the centre; navel-like.

UMBONATE. Bearing a convex projection or boss.

UNCINATE. Hooked at the extremity.

UNDULATE. Wavy; having a waved or sinuous margin.

UNGUICULATE. Applied to a petal which is narrowed at the base into a claw.

UNILATERAL. One-sided.

UNILOCULAR. One-celled.

UNISERIATE. Arranged in a single horizontal row or series.

UNISEXUAL. Of one sex; applied to flowers having stamens only or pistils only.

URCEOLATE. Urn-shaped; contracted at the mouth like an urn or pitcher.

UTRICLE. (1.) A seed-vessel consisting of a thin loose pericarp enclosing a single seed, as in *Chenopodium*. (2.) A membranous sac enclosing the fruit proper in *Carex* and *Uncinia*. (3.) Any bladder-shaped appendage.

VAGINA. A sheath, as of a leaf.

VAGINATE. Sheathed.

VALLECULE. A term applied to the grooves between the ribs of the fruit in *Umbelliferae*.

VALVATE. (1.) Opening by valves, as in the majority of dehiscent fruits and many anthers. (2.) In æstivation, applied when the parts of a flower-bud meet exactly at their edges without overlapping.

VALVE. One of the divisions into which a capsule or other dehiscent fruit separates at maturity; the door-like lid by which many anthers open.

VARIEGATED. Irregularly coloured in patches or blotches.

VARIETY. A subdivision of a species, differing from the type in certain constant characters of subordinate value.

VEIN. A strand of vascular tissue traversing a leaf or any other flat organ.

VEINED. Furnished with veins.

VEINLESS. Destitute of evident veins.

VEINLET. A small vein, or the ultimate branch of a vein.

VENATION. The manner in which the veins of leaves are arranged.

VENTRAL. The anterior or inner face of a carpel, &c.; the opposite of "dorsal."

VENTRICOSE. Swelling or inflated on one side.

VERNICOSE. Shiny, as if varnished.

VERRUCOSE. Covered with wart-like projections.

VERSATILE. Swinging freely on its support, as many anthers on their filaments.

VERTICAL. Upright; perpendicular to the plane of the horizon.

VERTICIL. A whorl, or an arrangement of similar bodies, as leaves in a circle about the axis.

VERTICILLATE. Arranged in whorls or verticils.

VESICLE. A small bladder or cavity.

VEXILLUM. The standard, or large upper petal of a papilionaceous corolla.

VILLOSE, VILLOUS. Bearing long and soft straightish hairs.

VIRGATE. Like a wand or rod ; slender, straight, and erect.

VISCID. Glutinous or sticky.

VITTÆ. The longitudinal oil-tubes in the pericarp of most *Umbelliferae*, easily seen when the fruit is cut across.

VITTATE. Furnished with vittæ.

VIVIPAROUS. Propagating by buds or bulblets instead of seeds, or with the seeds germinating while still attached to the plant.

WHORL. Any arrangement of organs in a circle round an axis ; a verticil.

WING. (1.) Any membranous or thin expansion or appendage attached to an organ. (2.) A lateral petal of a papilionaceous flower.

V. ADDITIONS AND CORRECTIONS.

I. RANUNCULACEÆ.

Page

- 4 **Clematis parviflora.**—To this species I refer with some doubt *C. Hillii*, Col. in Trans. N.Z. Inst. xxxi. (1899) 266, of which I have seen no authentically named specimens.
- 6 **Myosurus aristatus.**—Abundant in moist places near the mouth of the Awatere River, Marlborough, *J. H. Macmahon*!
- 10 2 *bis*. **Ranunculus Matthewsii**, *Cheesem. n. sp.*—Habit of *R. Buchanani*, but larger and stouter, 15–20 in. high, glabrous or with a few weak hairs on the petioles and peduncles. Radical leaves on stout petioles 3–9 in. long, reniform or orbicular in outline, ternatisect; the main divisions petiolate, coarsely toothed or lobed. Cauline leaves sessile, deeply toothed or lobed, but not so finely as in *R. Buchanani*. Flowers 1–4, large, pure-white, sweet-scented, 2½–3 in. diam. Sepals 5, slightly villous, reflexed when the flower is mature. Petals numerous, 12–20, oblong-cuneate, rounded at the tip, narrowed to the base; gland solitary, large, basilar. Achenes turgid, pilose, forming an oblong-globose head ½ in. diam. or more; styles long, subulate.
- SOUTH ISLAND: Otago—Mount Earnslaw, alt. 4000–6000 ft., *H. J. Matthews*!
- I have only two good specimens of this beautiful plant, and some allowance must consequently be made for the description. It is evidently very close to *R. Buchanani*, differing chiefly in the larger size and stouter habit, in being almost glabrous, and in the more sparingly divided leaves and larger flowers.
- 12 **R. nivicola.**—Mount Holdsworth, Tararua Range, *W. Townson*! Flowerless specimens apparently belonging to the same species have also been sent from Mount Stokes, Marlborough, by *Mr. J. H. Macmahon*.
- 14 **R. tenuicaulis.**—Boundary Peak, Lyell District, alt. 3000–4000 ft., *W. Townson*! Sources of the Poulter River and Kelly's Hill, Westland, *Dr. Cockayne*.
- 22 **R. Hectori.**—*Dr. Cockayne* considers that this is doubtfully distinct from *R. aucklandicus*. (See Trans. N.Z. Inst. xxxvii. 318.)

Page

- 25 **R. rivularis**.—According to Kirk's Students' Flora, Petrie's *R. areolatus* (Trans. N.Z. Inst. xxii. (1891) 439) is based upon a mixture of this species and the Scandinavian *R. pygmaeus*, Wahlb.

III. CRUCIFERÆ.

- 36 **Sisymbrium novæ-zealandiæ**.—Mount Blairish, Marlborough, *J. H. Macmahon* !
- 38 **Lepidium oleraceum** var. **frondosum**.—Curtis Island, Kermadec Group, *Miss Shakespere* !
- 43 **Notothlaspi australe** var. **stellatum**.—Boundary Peak, Lyell District, *W. Townson* !

IV. VIOLARIÆ.

- 46 **Melicytus collinus**, *Col. Excurs. N. Island*, 85.—A name quoted in the Index Kewensis, but I have seen no specimens nor description. Like most of Mr. Colenso's names, it probably does not represent a distinct species.

V. PITTOSPOREÆ.

- 56 **Pittosporum patulum**.—Cobb Valley, to the north of Mount Arthur, *F. G. Gibbs* !
- 56 9 *bis*. **P. Dallii**, *Cheesm. n. sp.*.—Apparently a small tree; branches stout, whorled, the younger ones glabrous, with reddish bark. Leaves towards the tips of the branchlets, alternate or subwhorled, $2\frac{1}{2}$ –4 in. long, elliptic-lanceolate or oblong-lanceolate to linear-oblong, acute or acuminate, coriaceous, sharply and coarsely doubly serrate; midrib stout, prominent above; veins finely reticulate; petioles $\frac{1}{2}$ – $\frac{3}{4}$ in. long, stout, reddish. Flowers not seen. Capsules numerous, arranged in corymbose cymes terminating the branches, about $\frac{1}{2}$ in. long, elliptic-oblong, apiculate, quite glabrous, 2-valved; valves hard and woody, rough and corrugated. Seeds numerous.

SOUTH ISLAND: Nelson—Mountains near Collingwood, *Dall* !

A remarkably distinct plant, with very different foliage to that of any other New Zealand species. The flowers are quite unknown.

VI. CARYOPHYLLÆ.

- 68 **Colobanthus brevisepalus**.—Summit of Mount Blairish, Marlborough, *J. H. Macmahon* !

Page

VII. PORTULACEÆ.

- 71 **Claytonia australasica.**—Mr. Colenso's *C. calycina* (Trans. N.Z. Inst. xxviii. 592) appears to be a synonym of this.

X. MALVACEÆ.

- 77 **Plagianthus cymosus.**—Pelorus Valley, Marlborough, rare, *J. H. Macmahon*! Female specimens have also been found at Kaitaia by *Mr. R. H. Matthews*.
- 80 **Gaya Lyallii, var. ribifolia, F. Muell. Veg. Chath. Is. 11.**—Leaves deeply lobed or incised, usually smaller and not so acuminate; stellate pubescence more conspicuous, especially on the under-surface.

A very distinct-looking variety, accidentally omitted in the body of this book. It is abundant in many parts of Marlborough and Canterbury, usually on the lower ranges flanking the eastern side of the Southern Alps; whereas the typical state is more common in the humid climate of Westland and Nelson. Dr. Cockayne considers that both forms are truly deciduous.

XI. TILIACEÆ.

- 83 **Aristotelia racemosa.**—Mr. Townson sends a variety from the Mokihinui River, to the north of Westport, in which the berries are clear bright-red when mature (not blackish-red), and rather larger than in the type.

XVI. OLACINEÆ.

- 97 **Pennantia corymbosa.**—Add as a synonym *P. odorata*, Raoul in Ann. Sc. Nat. Sér. iii. 2 (1844) 123.

XX. ANACARDIACEÆ.

- 104 **Corynocarpus.**—Mr. W. B. Hemsley, in an elaborate memoir published in the "Annals of Botany" for 1903, pp. 743–60, fully discusses the relationships of the genus, and describes two new species, one collected by Archdeacon Comins in Torres Island, New Hebrides, the other by Viellard in New Caledonia. He gives an amended generic character, in which attention is drawn to the curious fact that the gynæceum occasionally has a second rudimentary style. Full descriptions are also given of the three species. The two new ones from Polynesia are closely allied to *C. laevigata*, chiefly differing in the smaller foliage and in the shape of the petaloid staminodia. With respect to the systematic position of the genus, Mr. Hemsley confirms Professor Engler's statement respecting the

Page

total absence of resin-canals, which are present in all the other genera of *Anacardiaceæ*, but considers that this peculiarity is not accompanied by correlated characters of sufficient importance to justify the exclusion of the genus from the order. The discovery of *Corynocarpus* in western Polynesia is of considerable interest in connection with the often-quoted tradition that the New Zealand species was introduced by the Maoris when they first colonised the country.

XXII. LEGUMINOSÆ.

- 109 **Carmichaelia Muelleriana**, *Regel in Gartenf.* (1887) 611. —I have been unable to satisfactorily identify this plant, which is probably the same as one of the species described in this work.
- 112 **C. Williamsii**.—Barren specimens apparently referable to this species have been collected by Dr. Cockayne on the Poor Knights Islands, but the identification cannot be considered certain until flowering and fruiting specimens have been obtained.
- 120 **Clianthus puniceus**.—A variety with white flowers is now commonly cultivated in gardens.
- 121 **Swainsona novæ-zealandiæ**.—Mount Torlesse Range, Canterbury, alt. 3200-3600 ft., *Dr. Cockayne*.

XXIII. ROSACEÆ.

- 128 **Geum aucklandicum**, *Greene, Pittonia*, iv. 225. —This name must be substituted for *G. sericeum*, T. Kirk, over which it has several years' priority.
- 128 **G. uniflorum**. —Dr. Cockayne remarks that this is an extremely common plant of subalpine and alpine meadows and moist shady rocky places in Westland.
- 131 **Acæna sanguisorbæ** var. *antarctica*, *Cockayne in Trans. N.Z. Inst.* xxxvi. (1904) 319. —Dr. Cockayne proposes this name for the common form of the species in the Auckland and Campbell Islands, remarking that it can be distinguished from var. *pilosa* by the pale-green (not whitish-green) leaves which are glabrous on the upper surface, much shorter scapes which are hardly raised above the foliage, bright-green calyx-lobes, and by the shorter stamens. I have seen no specimens.


Page XXIV. **SAXIFRAGÆÆ.**

- 137 **Carpodetus serratus.**—The synonyms *C. dentatus*, Poir. Encyc. ii. 120, and *C. Forsteri*, Roem. and Schult. Syst. v. 604, were accidentally omitted in the body of this work.


XXV. **CRASSULACEÆ.**

- 143 **Tillæa purpurata.**—Mouth of the Awatere River, Marlborough, in places where water has stagnated, *J. H. Macmahon!*

XXVIII. **MYRTACEÆ.**

- 160 **Leptospermum scoparium.**—A variety with dark-red flowers, originally discovered by Mr. Justice Chapman in Otago, is now often cultivated as a garden-plant.
- 166 **Metrosideros tomentosa.**—Mr. Carse sends specimens of a yellow-flowered variety gathered at Rangaunu Harbour, near Mongonui.
- 169  **Myrtus obcordata.**—Reef Point, Ahipara, *R. H. Matthews!*
The most northern habitat yet recorded.

XXIX. **ONAGRARIÆÆ.**

- 175  **Epilobium confertifolium.**—Dr. Cockayne limits this species to the Auckland and Campbell Islands plant.
- 176 **E. pictum.**—Tinline Valley, Marlborough, *J. H. Macmahon!*
- 182 **E. vernicosum.**—Mount Owen, abundant, *W. Townson!*

XXXIII. **UMBELLIFERÆÆ.**

- 197 **Hydrocotyle moschata.**—Add to the synonyms *H. compacta*, A. Rich. in Ann. Sci. Phys. iv. (1820) 201; and *H. colorata*, Col. in Trans. N.Z. Inst. xviii. (1885) 260.
- 200 **Azorella reniformis.**—This was first referred to *Azorella* by Asa Gray in Bot. U.S. Expl. Exped. i. 698, and he should consequently be quoted as the authority.
- 203 **A. Hookeri**, *Drude in Engl. and Prantl, Pflanzenf.* 3, viii. 132. — A name proposed to take the place of *A. trifoliolata*, Hook. f., which is preoccupied by a Chilean species. (Clos in C. Gay, Fl. Chil. iii. 85.)

Page

- 203 10. **A. radians**, *Drude, l.c.*—This is quoted as a new species allied to *A. Hookeri*, but no description or locality is given.
- 203 **Eryngium vesiculosum**.—Abundant near the mouth of the Awatere River, Marlborough, *J. H. Macmahon!*
- 204 **Actinotus novæ-zealandiæ**.—Add to the synonyms *Hemiphues novæ-zealandiæ*, Petrie in Trans. N.Z. Inst. xii. (1880) 355.
- 209 **Aciphylla Colensoi var. conspicua**.—Mount Kelvin, near Westport, alt. 4500 ft., *W. Townson!*
- 209 **A. squarrosa**.—*Gingidium squarrosus*, F. Muell. Veg. Chath. Is. 18, should be quoted as a synonym.
- 210 **A. Hookeri**.—Brunner Mountains, *W. Townson!*
- 211 **A. Lyallii**.—Lyll Mountains, alt. 3500 ft., *W. Townson!* From the same locality Mr. Townson also sends a remarkable variety (?) with larger and more rigid leaves, the lower pinnæ of which are trifid or again pinnate. The bracts are also longer and more squarrose, with pinnately divided laminæ.
- 211 5 bis. **A. Townsoni**, *Cheesem. n. sp.*—Erect, slender, smooth and grassy, often somewhat flaccid, 6–12 in. high. Radical leaves numerous, very slender, 3–9 in. long, pinnate or bipinnate at the base; leaflets 2–4 pairs, very narrow, $\frac{1}{2}$ –3 in. long, $\frac{1}{30}$ – $\frac{1}{20}$ in. broad, usually flaccid but tipped by a short spinous point; margins minutely crenulate; petioles long, with broad membranous sheathing bases. Scape short, leafy; bracts very numerous, usually more rigid than the leaves, with broad membranous sheathing bases and a trifoliate or pinnately divided lamina. Male umbels numerous, compound, on long slender spreading peduncles; females much fewer and smaller, on shorter erect peduncles, almost concealed in the broad membranous bract-sheaths. Fruit linear-oblong, about $\frac{1}{5}$ in. long; carpels 3–5-winged.
- SOUTH ISLAND: Nelson—Mount Faraday, Mount Buckland, and the Lyell Mountains, alt. 3000–4500 ft., *W. Townson!*
- The nearest ally of this curious novelty appears to be *A. Lyallii* var. *crenulata*, from which it differs in the slender and almost flaccid habit, and in the extremely narrow leaf-segments.
- 212 **A. Monroi**.—Add as a synonym *Gingidium Monroi*, F. Muell. Veg. Chath. Is. 18.

Page

- 214 **A. Dieffenbachii.**—Include among the synonyms *Angelica Dieffenbachii*, Benth. and Hook. f. Gen. Plant. i. 916.
- 216 **Ligusticum antipodum.**—Add to the synonyms *Gin-gidium antipodum*, F. Muell. Veg. Chath. Is. 18.
- 219 **L. deltoideum.**—Lyell Mountains, alt. 3000–4000 ft., *W. Townson* !
- 219 11 bis. **L. diversifolium**, *Cheesem. n. sp.*—Habit and size of *L. carnosulum*, and like it thick and fleshy and glaucous-green when fresh. Stems 1–4 in. long, tufted at the top of a stout tortuous rootstock, with several radical leaves at the base, and 1–3 cauline ones just below the inflorescence. Leaves as in *L. carnosulum*, 2–3-ternately multifid with linear-subulate ultimate segments $\frac{1}{6}$ – $\frac{1}{3}$ in. long. Umbels usually solitary, compound, terminating the stem, 1–3 in. diam.; but sometimes smaller simple or compound umbels are developed in the axils of the cauline leaves. Involucral bracts 4–6, linear, flat, acute, quite entire or rarely forked, much shorter than the umbel; rays 6–12, stout, rigid. Secondary umbels small, many-flowered; bracts of the involuclers 8–12, linear, quite entire. Flowers crowded, white or pink, much as in *L. carnosulum* but rather larger and with more prominent calyx-teeth. Fruit not seen.

SOUTH ISLAND: Nelson—Shingle slopes on Mount Robert (overlooking Lake Rotoiti), alt. 4000 ft., *F. G. Gibbs* !

I have been much puzzled with this plant, which has the habit and foliage of *L. carnosulum*, but differs markedly in the much smaller linear and entire involucral bracts, and in smaller simple or compound umbels often being developed in the axils of the cauline leaves. In *L. carnosulum* the bracts are similar to the leaves—that is, are ternately multifid, and the primary ones far overtop the umbel. There is never more than a single terminal compound umbel, and the stems are usually very short.

- 223 **Angelica trifoliolata.**—Sphagnum bogs near the summit of Porter's Pass, Canterbury, *Dr. Cockayne*.

XXXIV. ARALIACEÆ.

- 227 **Aralia Lyallii.**—This species, which was originally described as a *Stilbocarpa* by Armstrong, has been, with much reason, replaced in that genus by Harms (Engl. and Prantl, Pflanzenf. 3, viii. 57), but in a separate section, for which he proposes the name *Kirkophytum*.
- 227 **A. Lyallii var. robusta.**—Mr. Justice Chapman, who has collected this on the Snares, informs me that it can be readily distinguished from the type by not possessing stolons, and by its larger size, leaves having been measured 28 in. in diameter.

Page

- 228 **Panax.**—In Engler and Prantl's Pflanzenfamilien the whole of the New Zealand species are placed in Miquel's genus *Nothopanax*, a course indicated by Seemann as far back as 1866. But there is much confusion and no small diversity of opinion regarding the classification of the order, and most of the genera require careful re-examination. Until this has been done it seems inadvisable to alter the position of our species.
- 228 **P. lineare.**—Add as a synonym *Nothopanax linearis*, Harms in Engl. and Prantl, Pflanzenf. 3, viii. 48.
- 229 **P. simplex.**—Include among the synonyms *P. integrifolius*, Col. in Trans. N.Z. Inst. xx. (1888) 192; *Nothopanax simplex*, Seem. Journ. Bot. iv. (1866) 296; and *N. integrifolium*, Harms, l.c.
- 229 **P. Edgerleyi.**—*Nothopanax Edgerleyi*, Harms, l.c.
- 230 **P. anomalum.**—*Nothopanax anomalum*, Seem. l.c.; *N. microphyllum*, Harms, l.c.
- 230 **P. Sinclairii.**—*Nothopanax Sinclairii*, Seem. l.c.
- 231 **P. Colensoi.**—*Nothopanax Colensoi*, Seem. l.c.
- 231 **P. arboreum.**—*Nothopanax arboreum*, Seem. l.c.
- 233 **Pseudopanax discolor.**—This was first referred to *Pseudopanax* by Harms (Engl. and Prantl, Pflanzenf. 3, viii. 46).
- 234 **P. Lessonii.**—Add to the synonyms *Aralia Lessonii*, Hook. f. Fl. Nov. Zel. i. 96.
- 235 **P. crassifolium.**—Include among the synonyms *Aralia heterophylla*, A. Cunn. ex Hook. Ic. Plant. t. 583.
- 236 **P. ferox.**—Reef Point, near Ahipara, *R. H. Matthews*!

XXXVII. RUBIACEÆ.

- 246 **Coprosma grandifolia.**—Add to the synonyms *C. latifolia*, Col. ex Cheesem. in Trans. N.Z. Inst. xix. (1887) 229; and *C. lanceolata*, Col. l.c. xxxi. (1899) 270.
- 249 **C. Cunninghamii.**—To this should be referred *C. conferta*, A. Cunn. Precur. n. 471.
- 250 **C. tenuifolia.**—Mount Kakaramea, and forests near the base of Tongariro, abundant, *T. F. C.*

Page

- 252 **C. areolata.**—Mr. Carse informs me that the fruit requires from fourteen to sixteen months to ripen.
- 255 **C. crassifolia.**—Mr. Colenso's *C. arcuata* (Excurs. North Island, 84) is probably the same as this species.
- 257 27 bis. **C. rugosa**, *Cheesem. n. sp.*—A much and densely branched rigid erect shrub 4–8 ft. high; branches stout, divaricating, often interlaced, glabrous or the younger ones puberulous; bark fissured and uneven, dark-brown or dark red-brown, of the branchlets yellowish-brown. Leaves in opposite pairs or fascicles, $\frac{1}{4}$ – $\frac{3}{4}$ in. long, $\frac{1}{25}$ in. broad, narrow-linear or narrow linear-spathulate, subacute or acute, spreading, veinless, narrowed into a short petiole or sessile; stipules ciliolate. Flowers involucrellate, axillary, terminating minute arrested branchlets. Males solitary or in 2–3-flowered fascicles; calyx wanting; corolla $\frac{1}{4}$ in. long, campanulate, deeply 4-partite; stamens 4. Females solitary or rarely two together; calyx-limb 4-toothed; corolla deeply 4-lobed. Drupe $\frac{1}{4}$ – $\frac{1}{3}$ in. long, broadly oblong or almost globose, pale-blue, almost translucent.

SOUTH ISLAND: Nelson—Buller Gorge, *W. Townson*! Clarence Valley, *T. F. C.* Canterbury—Arthur's Pass and Mount Cook District, *T. F. C.* Otago—Near Dunedin, *Petrie*! Sea-level to 3000 ft.

Closely allied to *C. acerosa* var. *brunnea*, from which it differs in the much larger size and erect habit, longer and narrower often petioled leaves, in the longer calyx-lobes of the female flowers, and in the more oblong drupe. It is probably common in mountain districts throughout the South Island.

XXXVIII. COMPOSITÆ.

- 277 **Brachycome Thomsoni** var. **membranifolia.**—Mount Murchison and Brunner Mountains, alt. 2000–4000 ft., *W. Townson*!
- 281 **Olearia operina.**—Add to the synonyms *Eurybia operina*, *F. Muell. Veg. Chath. Is. 22.*
- 282 **O. Colensoi.**—Quote as a synonym *Eurybia Colensoi*, *F. Muell. Veg. Chath. Is. 22.*
- 286 **O. Cunninghamii.**—Mount Frederic, near Westport, *W. Townson*!
- 287 **O. excorticata.**—Dr. Cockayne states (*Trans. N.Z. Inst. xxxvii. 366*) that this is not uncommon in the subalpine scrub of Westland, but I have seen no specimens from thence.

Page

- 296 **Pleurophyllum criniferum.**—Add to the synonyms *P. oresigenesum*, Decne. in Bot. Voy. Astrol. et Zél. 37.
- 300 **Celmisia Walkeri.**—Dr. Cockayne remarks that this is “a most characteristic plant of the subalpine meadows of Westland, and of moist rocky places in the same region” (Trans. N.Z. Inst. xxxvii. 367).
- 302 **C. Dallii.**—Mount Lockett, Nelson, *F. G. Gibbs*!
- 307 **C. petiolata var. membranacea.**—Brunner Mountains, alt. 4,000 ft., *W. Townson*!
- 313 **C. Monroi.**—Taylor’s Pass, Awatere Valley, *J. H. Macmahon*! Almost precisely matches one of Monro’s original specimens, now in Mr. Petrie’s herbarium.
- 314 **C. longifolia.**—*C. asteliaefolia*, Hook. f. Fl. Antarct. i. 35; and *C. perpusilla*, Col. in Trans. N.Z. Inst. xxii. (1890) 470, are both referable to this species.
- 324 **Gnaphalium subrigidum.**—Mr. Townson has sent me a specimen from the Buller Valley, near Westport, the first I have seen from the South Island.
- 329 **Raoulia australis.**—I have erroneously quoted *R. Mackayi*, Buch. in Trans. N.Z. Inst. xiv. (1882) 354, as a synonym of this species. It is a variety of *Gnaphalium Traversii*.
- 338 **Helichrysum filicaule.**—Add as a synonym *Gnaphalium parviflorum*, Col. in Trans. N.Z. Inst. xiv. (1884) 333.
- 340 **H. Leontopodium.**—Mount Richmond, Nelson, *J. H. Macmahon*!
- 343 **H. coralloides.**—Source of the Conway River, South Marlborough, *Dr. Cockayne*.
- 351 **Cotula australis.**—Recorded from Campbell Island by Mr. Buchanan. (See Trans. N.Z. Inst. xvii. 399.)
- 358 **C. dioica.**—I believe that one of the forms of this species was collected in the Auckland Islands by Dr. Koettlitz during the recent visit of the Antarctic exploring-ship “Discovery.”
- 367 **Brachyglottis Rangiora.**—This would have been better treated as a variety of *B. repanda*. Mr. J. R. Annabell informs me that it occurs between Patea and Hawera, and at Waitotara.

Page

- 380 **Senecio Monroi.**—Mount Blairish, North Marlborough,
J. H. Macmahon.
- 381 **S. Adamsii.**—Mount Lockett, to the north of the Mount
Arthur Plateau, *F. G. Gibbs!*
- 383 **S. rotundifolius.**—Add to the synonyms *S. Reinoldi*,
Endl. ex Hook. f. Handb. N.Z. Fl. 734.
- 388 **Sonchus asper.**—Shores of Auckland Island, *Dr. Koettlitz.*
The Snares and Antipodes Island, *Kirk.*

XLI. CAMPANULACEÆ.

- 398 **Pratia angulata var. arenaria.**—Chatham Islands, *F. A. D.*
Cox!

XLIII. EPACRIDEÆ.

- 410 **Pentachondra pumila.**—I refer to this Mr. Colenso's
Leucopogon heterophyllus (Trans. N.Z. Inst. xx. (1888) 198).
- 414 **Leucopogon Fraseri.**—Add to the synonyms *Penta-*
chondra mucronata, Hook. f. in Hook. Lond. Journ. Bot. vi.
(1849) 270.
- 421 **Dracophyllum strictum.**—I suspect that *D. Featonianum*,
Col. in Trans. N.Z. Inst. xxii. (1890) 477, of which I have seen
no authentic specimens, is nothing more than a state of this.
- 422 **D. recurvum.**—Very plentiful near the base of Tongariro
and Ruapehu, where it forms a low rigid shrub with spreading
or almost prostrate branches, the whole plant forming dense
masses 2-5 ft. diam., but usually not rising more than 1-2 ft.
from the ground.
- 425 **D. subulatum.**—*D. angustifolium*, Col. in Trans. N.Z. Inst.
xxviii. (1896) 603, is probably a synonym.

XLV. MYRSINEÆ.

- 434 **Myrsine divaricata.**—Dr. Cockayne informs me that this
is plentiful on the Poor Knights Islands, between Whangarei
and the Bay of Islands, a somewhat unexpected locality.

Page

XLIX. LOGANIACEÆ.

- 443 **Logania depressa.**—In the body of this work I have followed the "Handbook" in giving the Ruahine Range as the locality where this species was originally collected. The exact habitat, however, was on the margin of the Onetapu Desert, near the base of Ruapehu. (See Mr. Colenso's "Visits to the Ruahine Range," p. 43.)

L. GENTIANEÆ.

- 446 **Gentiana.**—Since the arrangement given in the body of this work was printed I have received copious suites of specimens from Messrs. Townson, Macmahon, Gibbs, H. J. Matthews, and others. These by no means simplify the task of providing good distinctive characters for the species, but rather increase it, so many of the specimens being intermediate forms. This is particularly the case with the species constituting the section D of the conspectus given on page 447, the whole of which appear to pass into one another by imperceptible gradations.

- 448 2 bis. **G. gracilifolia**, *Cheesem. n. sp.*—Perennial, dark-green, much branched at the base, forming compact sward-like patches 2-6 in. diam. or more. Flowering-stems numerous, 3-6 in. high, decumbent at the base, erect above. Leaves numerous, crowded at the base of the stem or on short erect branches, $\frac{1}{3}$ - $\frac{2}{3}$ in. long, $\frac{1}{10}$ - $\frac{1}{8}$ in. broad, narrow linear-spathulate or linear-lanceolate, acute, sessile or the lower ones narrowed into short petioles, rather thick and coriaceous, dark-green and shining when fresh, often blackish-brown when dry. Cauline leaves 2-4 distant opposite pairs, similar to the radical. Flowers 2-4 to each stem, $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., pure-white. Calyx divided from two-thirds to three-quarters of the way down; lobes lanceolate or linear-lanceolate, acute or acuminate. Corolla campanulate, divided two-thirds of the way down; lobes oblong-obovate, obtuse or subacute. Stamens about half as long as the corolla. Ovary linear-oblong.

SOUTH ISLAND: Nelson—Peaty localities by the margin of small tarns on the Mount Arthur Plateau, alt. 3500-4500 ft., *T. F. C.*, *F. G. Gibbs*! February-March.

This appears to be a perfectly distinct species, perhaps more nearly allied to *G. Townsoni* than to any other, but easily distinguished by the much smaller size, by often forming a compact sward, by the smaller narrower and much more numerous leaves, and by the smaller and fewer flowers.

Page

- 451 **G. montana.**—Brunner Range, alt. 3000–4000 ft., *W. Townson!* Mr. Gibbs also sends specimens of a closely allied plant, with slightly longer and narrower cauline leaves, from Mount Lockett and Mount Peel.

- 452 9 *bis.* **G. vernicosa,** *Cheesem. n. sp.*—Perennial; root long, slender, bearing at the top a compact tuft of radical leaves, and 1–5 stout flowering-stems 4–9 in. high, which are decumbent at the base but erect above. Radical leaves numerous, crowded, $\frac{1}{2}$ – $1\frac{1}{4}$ in. long, $\frac{1}{6}$ – $\frac{1}{3}$ in. broad, narrow oblong-spathulate or linear-oblong, obtuse or subacute, narrowed to a broad sessile base, dark-green, polished and shining, somewhat concave above, thick and coriaceous, especially towards the tip, but becoming thinner at the base. Cauline leaves many towards the base of the flowering-stems, in distant pairs above, similar to the radical but smaller and more acute. Flowers large, white, $\frac{1}{2}$ – $\frac{3}{4}$ in. diam., in 2–7-flowered terminal umbels or corymbose cymes. Calyx half the length of the corolla; lobes lanceolate or oblong-lanceolate, acute. Corolla divided three-quarters of the way down or more; lobes obovate-oblong, rounded at the tip. Ovary linear-oblong.

SOUTH ISLAND: Nelson—Mount Lockett (to the north of Mount Arthur), alt. 3500–4500 ft., *F. G. Gibbs!* February–March.

I have only three good specimens of this plant, but they all agree in the thick and coriaceous polished and shining leaves, which present quite a different appearance from those of any other species known to me. But it is possible that it may vary into *G. bellidifolia*.

LI. BORAGINACEÆ.

- 469 18 *bis.* **Myosotis Townsoni,** *Cheesem. n. sp.*—Perennial; more or less densely hispid with soft spreading white hairs; rootstock rather long, prostrate, branched; stems few or many, slender, leafy, prostrate or decumbent below, ascending or erect at the tips. Radical leaves on long slender petioles $\frac{1}{3}$ – $\frac{2}{3}$ in. long; blade $\frac{1}{2}$ –1 in. by $\frac{1}{4}$ – $\frac{1}{3}$ in., oblong-spathulate or linear-oblong, obtuse or apiculate, membranous, upper surface densely hispid with soft white hairs, often almost glabrous beneath. Cauline leaves numerous, narrow-oblong, sessile or the lowermost petiolate. Flowers in the axils of the upper cauline leaves or forming few-flowered racemes terminating the stem, $\frac{1}{4}$ – $\frac{1}{3}$ in. long, $\frac{1}{5}$ – $\frac{1}{4}$ in. diam., sessile or the lowermost shortly pedicelled. Calyx hispid with coarse white hairs, 5-lobed below the middle; lobes linear-lanceolate, acute. Corolla-tube cylindric, much longer than the calyx; throat with 5 scales; limb broad flat, with broadly oblong lobes.

Page

Stamens inserted between the corolla-scales; filaments slightly longer than the linear anthers, which are wholly above the level of the scales. Nutlets ovoid, shining, black.

SOUTH ISLAND: Nelson—Brunner Range and Lyell Mountains, *W. Townson!* 3000–4500 ft. January–March.

In the structure of the flower this is intermediate between *Exarrhena* and *Eumyosotis*, but as the anthers stand above the level of the scales I have placed it in the former section. It is apparently allied to *M. saxosa* and *M. Lyallii*, but differs from both in the flowers being chiefly axillary.

470 **M. concinna.**—Abundant on the southern face of Mount Owen, alt. 3000–4500 ft., *Townson!*

472 **Myosotidium nobile.**—Insert as a synonym *Cynoglossum nobile*, Hook. f. in Gard. Chron. (1858) 240.

LIV. SCROPHULARINEÆ.

486 **Mazus radicans.**—To this species I refer *Ourisia montana*, Buch. in Trans. N.Z. Inst. xix. (1887) 214, t. 15, f. 1.

516 **Veronica elliptica.**—Add as a synonym *V. marginata*, Col. in Trans. N.Z. Inst. xxviii. (1896) 608. With respect to the inclusion of Hooker's *V. odora* with *V. elliptica*, Dr. Cockayne has independently come to the same conclusion as myself.

522 **V. Cockayniana.**—This appears to have a wide range on the western side of the Southern Alps, at altitudes above 3000 ft., stretching from Mount Peel and the Lyell Mountains to Lake Wanaka.

528 **V. Gilliesiana.**—Mount Lyell and the Brunner Mountains, alt. 4000–5000 ft., *W. Townson!*

547 **V. Cheesemanii.**—Mount Richmond and Mount Fishtail, North Marlborough, alt. 4000–5000 ft., *J. H. Macmahon!*

550 **Ourisia sessilifolia.**—Diamond Lake Range, to the north of Mount Peel, *F. G. Gibbs!*

553 **Euphrasia cuneata.**—Mr. J. H. Macmahon has sent me numerous specimens of this species collected on the shores of Pelorus Sound, Marlborough, where he states it is plentiful. So far, these are the only specimens I have seen from the South Island. It is worth mention that according to A. Richard the type specimens were collected in Tolago Bay: “*Crescit in Novæ-Zelandiæ, rupibus maritimis loco dicto baie Tologa.*”

Page

LVIII. VERBENACEÆ.

- 565 **Vitex lucens.**—An interesting account of the pollination of this species, prepared by Mr. Petrie, is printed in Trans. N.Z. Inst. xxxvii. (1905), pp. 409–11.

LXIV. CHENOPODIACEÆ.

- 578 **Rhagodia nutans.**—South Island: Kaikoura Peninsula, *Rev. R. H. Spencer!* Rocky places near the sea, Banks Peninsula, *Dr. Cockayne.*
- 584 **Atriplex Billardieri.**—Shore of Ruapuke Island, Foveaux Strait, *Dr. Cockayne.*

LXV. POLYGONACEÆ.

- 593 **Muhlenbeckia ephedrioides.**—Marlborough: Stony bed of the Conway River, near its source, *Dr. Cockayne.*

LXVI. PIPERACEÆ.

- 596 **Peperomia reflexa.**—Near Gisborne, *Bishop Williams!*

LXVIII. MONIMIACEÆ.

- 599 **Hedycarya arborea.**—Preservation Inlet, *Dr. Cockayne.* The most southern locality yet recorded.

LXXI. THYMELÆACEÆ.

- 609 **Pimelea longifolia.**—Charlestown, on rocks near the sea, *Townson!* The most southern locality I am acquainted with. Add to the synonyms *P. congesta*, F. Muell. *Fragm. Phyt. Austral.* viii. 9.
- 611 **P. virgata.**—Insert as a synonym *P. axillaris*, Banks and Soland. ex Wikstr. in Vet. Akad. Handl. Stockh. (1818) 280.
- 612 **P. arenaria.**—To this should be referred *P. villosa*, Banks and Soland. ex Meissn. in D.C. Prodr. xiv. 517.
- 613 **P. Suteri.**—I am indebted to Mr. F. G. Gibbs for excellent specimens of this species, which so far has only been found on the Dun Mountain Range, Nelson.
- 616 **Drapetes villosa var. multiflora.**—Brunner Range, alt. 4000 ft., *W. Townson!*

Page

LXXII. LORANTHACEÆ.

617

An important series of memoirs on the structure and classification of this order, by the French botanist Van Tieghem, is printed in the Bulletin of the Botanical Society of France for the years 1894-96 (Vols. xli. to xliii.). One of these memoirs, entitled "Sur les Loranthoidées de la Nouvelle-Zélande," deals specially with the New Zealand species included by all previous writers in the genus *Loranthus*, and contains many original and valuable observations. In addition to the 5 species given by Hooker in the Handbook, Van Tieghem accepts the whole of those (5) described by subsequent authors, and publishes 5 others as new, thus enumerating 15 species in all. These he distributes in 7 new genera, with one exception confined to New Zealand. Van Tieghem's liberal ideas as to the number of genera are not restricted to the New Zealand species, for in a conspectus of the whole order he admits no fewer than 133, whereas Hooker and Bentham, in the "Genera Plantarum," only gave 13. Van Tieghem's researches have to a large extent supplied the basis of a new classification of the order proposed by Engler in "Die Pflanzenfamilien" (Nachtrage, i. 124), although most of his genera are reduced to the position of subgenera or sections. The following sketch will show how the New Zealand species are disposed of under Engler's arrangement.

* Perianth double.

Ovary more or less distinctly 2- or more-celled	..	1. ELYTRANTHE.
Ovary distinctly 1-celled. Anthers basifixed	..	2. LORANTHUS.
Ovary distinctly 1-celled. Anthers versatile	..	3. PHRYGILANTHUS.

** Perianth single.

Leafy. Flowers in axillary or terminal panicles	..	4. TUPEIA.
Leafless. Flowers at the nodes of the jointed stems		
or branches	.. .. .	5. KORTHALSELLA.

1. ELYTRANTHE Blume.

1. **E. Colensoi**, *Engl. in Engl. and Prantl, Pflanzenf. Nachtr. i.* 126. *Peraxilla Colensoi*, *Van Tieghem in Bull. Soc. Bot. Fr.* xli. (1894) 500. *Loranthus Colensoi*, *Hook. f. in Hook. Ic. Plant.* t. 633. (*Manual*, 619.)

Mr. Mayo informs me that this is occasionally parasitic on introduced trees. At Motueka (Nelson) he has observed it growing on Pears, Plums, and on *Robinia pseudacacia*.

2. **E. tetrapetala**, *Engl. l.c.* — *Peraxilla tetrapetala*, *Van Tiegh. l.c.* *Loranthus tetrapetalus*, *Forst. Prodr.* n. 156. (*Manual*, 618.)

Colenso's *Loranthus punctatus* (*Peraxilla punctata*, *Van Tiegh.*; *Elytranthe punctata*, *Engl.*) is doubtless identical with this species, judging

Page

from an imperfect specimen in his herbarium. Van Tieghem's *Peraxilla uniflora* and *P. Haastii*, both of which are accepted and referred to *Elytranthe* by Engler, are said to be closely allied; but as no descriptions or diagnostic characters are given I cannot express any opinion as to their validity. Van Tieghem also retains Kirk's *Loranthus decussatus* as a distinct species; placing it, under the name of *Peraxilla decussata*, in the immediate neighbourhood of *E. Colensoi*, with which he states it agrees in having the flowers in axillary racemes. No doubt he has been influenced by Kirk's original description, in which the flowers are described as being arranged in "2-4-flowered racemes." But the type specimens in Kirk's herbarium all have the flowers solitary in the axils of the leaves, and this is also the case with specimens collected by myself in the locality where it was first obtained by Kirk. I can entertain no doubt of its identity with *E. tetrapetalus*, and consider that the mistake in Kirk's diagnosis was probably due to some accidental mixture of specimens. As mentioned in the body of this work, the name of *L. tetrapetalus* is applied in Kirk's herbarium to the following species.

3. **E. Adamsii**, *Engl. l.c.* *Trilepidea Adamsii*, *Van Tiegh. l.c.* *Loranthus Adamsii*, *Cheesem. in Trans. N.Z. Inst.* xiii. (1881) 296. (*Manual*, p. 620.)

The fruit of this has been forwarded by Mr. Adams. It is bright-red, oblong or oblong-obovoid, viscid, about $\frac{1}{2}$ in. long. Van Tieghem mentions a *Trilepidea Ralphii* (*Bull. Soc. Bot. Fr.* xli. (1895) 28) as a closely allied species, but he gives no distinctive characters.

4. **E. flavida**, *Engl. l.c.* *Alepis flavida*, *Van Tiegh. l.c.* *Loranthus flavidus*, *Hook. f. Fl. Nov. Zel.* i. 100, t. 27. (*Manual*, 620.)

Van Tieghem also accepts Colenso's *L. polychroa*, giving it the name of *Alepis polychroa*. Probably he has seen no specimens, for the examination of one given to me by Mr. Colenso leaves no doubt in my mind that it is absolutely identical with *E. flavida*.

2. LORANTHUS, Linn.

1. **L. micranthus**, *Hook. f. Fl. Nov. Zel.* i. 100. *Ileostylus micranthus*, *Van Tiegh. l.c.* xli. (1894) 489. (*Manual*, 618.)

Van Tieghem's *Ileostylus Kirkii* (*l.c.* xlii. (1895) 25) is based upon specimens collected near Auckland by Kirk, and is said to differ from the type in the shape and structure of the leaves. But no second species exists in Mr. Kirk's herbarium, and the typical form is the only one I have seen near Auckland.

L. micranthus is sometimes parasitic on introduced trees. At the Native settlement of Waihi, at the south end of Lake Taupo, it grows in great abundance on Pear and Plum trees.

2. **L. Fieldii**, *Buch. in Trans. N.Z. Inst.* xvi. (1884) 397.— "Leaves 1-1 $\frac{1}{2}$ in. long, linear-oblong, rounded at the tip and narrowed into a very short petiole at the base, midrib indistinct. Racemes 3-4 in. long, tetrachotomously 16-flowered.

Page

Flowers 1-1½ in. long, bright - crimson tipped with dark-purple, and yellowish towards the base, petals free to the bottom, anthers linear."—*Neamyza Fieldii*, *Van Tiegh. l.c. xlii.* (1895) 25.

NORTH ISLAND: Base of Ruapehu, *H. C. Field.*

Only known from Buchanan's very incomplete description, quoted above. It is accepted by both Van Tieghem and Engler, the first creating the new genus *Neamyza* for its reception, the latter keeping it in *Loranthus*.

3. PHRYGILANTHUS, Eichl.

1. *P. tenuiflorus*, *Engl. l.c. 134.* *Hookerella tenuiflora*, *Van Tiegh. l.c. xlii.* (1895) 25. *Loranthus tenuiflorus*, *Hook. f. Fl. Nov. Zel. i. 100.* (*Manual*, 620.)

2. *P. Raoulii*, *Engl. l.c. 134.* *Mullerina Raoulii*, *Van Tiegh, l.c.*

NORTH ISLAND: Bay of Islands, *Raoul* (on *Metrosideros*); Whangaroa, *A. Cunningham* (on *Metrosideros* and *Vitex*).

New Zealand botanists are indebted to Professor Van Tieghem for pointing out the distinctness of this species, which was confounded with *Loranthus tetrapetalus* by both Cunningham and Raoul. It is much more nearly allied to the preceding species, from which it differs in the inflorescence being composed of terminal (not axillary) trichotomous panicles. The flowers differ from all the other New Zealand species in being pentamerous, and the anthers are versatile.

4. TUPEIA, Cham. et Schl.

1. *T. antarctica*, *Cham. et Schl. in Linnæa iii.* (1828) 203; *Van Tiegh. l.c. xlii.* (1895) 643; *Engl. l.c. 133.* (*Manual*, 621.)

Van Tieghem draws attention to the fact that this species is not simply dioecious, as described by Hooker, but consists of three sorts of individuals—hermaphrodites, males, and females. This peculiarity was first pointed out by A. Richard, from Forster's manuscripts (*Flore Nouv. Zél.* 269).

5. KORTHALSELLA, Van Tiegh.

1. *K. salicornioides*, *Van Tiegh. l.c. xliii.* (1896) 165; *Engl. l.c. 138.* *Viscum salicornioides*, *A. Cunn. Precur. n. 485.* (*Manual*, 623.)

2. *K. Lindsayi*, *Engl. l.c. 138.* *Heterixia Lindsayi*, *Van Tiegh. l.c. 178.* *Viscum Lindsayi*, *Oliv. ex Hook. f. Handb. N.Z. Fl. 108.* (*Manual*, 622.)

Page

3. **K. clavatum**, *Cheesem.* *Viscum clavatum*, *T. Kirk in Trans. N.Z. Inst.* xxiv. (1892) 429, t. 37. (*Manual*, 622.)

Korthalsella amentacea (*Heterixia amentacea*, Van Tiegh.), a New-Caledonian species, is erroneously stated in the "Pflanzenfamilien" to be a native of New Zealand.

LXXIX. ORCHIDÆ.

668 **Thelymitra**.—I have been unable to identify *T. formosa*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 338; *T. concinna*, Col. l.c. xx. (1888) 207; *T. nervosa*, Col. l.c. 207; and *T. fimbriata*, Col. l.c. xxii. (1890) 490.

669 **T. longifolia**.—Ascends to 4,500 ft. on Mount Kakaramea, Taupo, where it is associated with the next species.

670 4 *bis*. **T. decora**, *Cheesem. n. sp.*—Stem slender, 6–12 in. high or more. Leaf shorter than the stem, narrow-linear, thick and fleshy, channelled, $\frac{1}{6}$ – $\frac{1}{3}$ in. broad; empty bracts 1–3, the upper one broader and more membranous. Flowers 1–4, about $\frac{1}{2}$ in. diam., dark-blue, the two lateral petals obscurely spotted with brown. Sepals and petals ovate-oblong, subacute. Column short, stout, about half the length of the perianth, the wing continued behind the anther and longer than it, 3-lobed; middle lobe the shortest but exceeding the anther, hood-shaped, truncate, the margin thick and fleshy and denticulate, the back minutely warted, the anterior angle on each side slightly produced and acute; lateral lobes much larger than the middle lobe, pointing forwards, terminated by a dense rounded brush of cilia. Anther broad; connective terminating in a stout horn-like point.

NORTH ISLAND.—Summit of Mount Kakaramea, Taupo, and hills near the base of Ngauruhoe, alt. 3000–5000 ft., *T. F. C.* January.

This is probably nearer to Berggren's *T. intermedia* than to any other species, but (judging from his plate and description) differs in the broader and more truncate middle lobe of the column-wing, which is denticulate on the margin and warted on the back, and not at all bifid, and in the much shorter and more densely ciliate lateral lobes. *T. longifolia* is at once removed by the much longer and more distinctly hooded middle lobe of the column-wing, with an entire margin and smooth back, and by the shorter and more densely ciliate lateral lobes, which do not exceed the middle lobe.

670 4 *ter*. **T. pachyphylla**, *Cheesem. n. sp.*—Stem tall, stout or rather slender, 9–18 in. high or more. Leaf shorter than the stem, usually very thick and fleshy, grooved and channelled, variable in breadth, sometimes as much as $\frac{3}{4}$ in. across; empty bracts 2 or 3, thick and fleshy, sheathing. Flowers 3–6 or

Page

more in a raceme, large and handsome, $\frac{3}{4}$ –1 in. diam., blue-purple. Sepals and petals oblong-ovate or broadly oblong, subacute. Column short, stout, about half as long as the perianth, the wing continued behind the anther but hardly as long as it, 3-lobed; middle lobe short, broad, indistinctly hood-shaped, truncate at the top with an even or denticulate margin; lateral lobes longer than the middle one, erect or pointing forwards, flattened, the margins divided into numerous simple or branched fimbriæ. Anther broad; connective produced into a stout horn-like point which usually overtops the middle lobe of the column-wing.

SOUTH ISLAND: Nelson—Vicinity of Westport, *Townson*! Westland—Kumara, *Brame*!

This has doubtless been confused with *T. pulchella*, from which, however, it totally differs in the structure of the column. In *T. pulchella* the middle lobe of the column-wing is much shorter than the anther, while the lateral lobes are barely as long as it, and are irregularly toothed or jagged, and not at all ciliate or fimbriate. In the present species the middle lobe almost equals the anther, while the lateral lobes are longer than it, and are provided with numerous fimbriæ. *T. longifolia* differs in the smaller flowers, much longer and distinctly hooded middle lobe of the column-wing, and in the shorter lateral lobes, which terminate in a dense rounded brush of white cilia.

- 671 **T. imberbis**.—Mr. R. H. Matthews sends a variety with cream-coloured flowers from Kaitaia (Mongonui County).
- 673 **Orthoceras strictum**.—Vicinity of Westport, *Townson*! The most southern locality yet recorded.
- 676 **Prasophyllum rufum**.—Vicinity of Westport, not uncommon in mossy stony places up to 1000 ft., *Townson*! I suspect that the New Zealand plant will prove to be a different species to the Australian, and it is also probable that the North Island plant described in the Handbook under the name of *P. nudum* is distinct from Macmahon's and Townson's South Island specimens. Mr. Townson's specimens have a broad obtuse lip, but in Fitzgerald's Australian Orchids (Vol. ii, Part 4) the lip of *P. rufum* is represented as lanceolate and acute.
- 680 **Pterostylis micromega**.—Swamps near Lake Tongongoe, Kaitaia, *R. H. Matthews*! Coromandel, *Joliffe* (Handbook).
- 681 **P. venosa**.—Nelson—Ranges between Motueka and Takaka, *Rev. R. H. Spencer*!
- 683 **P. barbata**.—Bare clay hills at Whangarei, *W. T. Ball*!
- 694 **Corysanthes rivularis**.—Add to the synonyms *Acianthus rivularis*, A. Cunn. Precur. n. 312.

Page

LXXXI. **AMARYLLIDÆ.**

- 701 **Hypoxis pusilla.**—New Zealand specimens are usually much smaller than Australian, and in most of the localities it is rare for the scape to have more than one flower.

LXXXII. **LILIACEÆ.**

- 704 **Cordyline.**—*C. rubra*, Hueg. ex Kunth. Enum. pl. v. 34, is often quoted as a native of New Zealand, but is really a garden-plant of unknown origin. Mr. Baker remarks that it is intermediate between the widely diffused *C. terminalis* and the Australian *C. stricta*, Endl. I know nothing of *C. Hooibrenkeana*, Goepp, in Nov. Act. Cur. xxv. (1855) 55, also said to come from New Zealand.
- 708 **Astelia.**—I have failed to identify the following species described by Mr. Colenso: *A. spicata*, Trans. N.Z. Inst. xix. (1882) 335; *A. subrigida*, l.c. xix. (1887) 268; and *A. planifolia*, l.c. xx. (1888) 209.
- 711 **A. Banksii.**—Mr. Townson sends specimens of apparently this species from the vicinity of Westport.
- 712 **A. trinervia** and **A. Solandri.**—Both of these have also been collected at Westport by Mr. Townson.
- 716 **Phormium Cookianum.**—Bishop Williams has described and figured a remarkable sport of this species in which the flowers are replaced by tufts of foliage leaves, the scapes thus bearing numerous dense clumps of leaves which sometimes reach the length of 12 in. to 18 in. For a detailed account see his paper in Trans. N.Z. Inst. xxxvi. 333.

LXXXV. **PANDANEÆ.**

- 741 **Freycinetia Banksii.**—Forms the chief component of the vegetation on the Open Bay Islands, off the coast of South Westland, *Dr. Cockayne*. (See Trans. N.Z. Inst. xxxvii. 368.)

LXXXVI. **TYPHACEÆ.**

- 744 **Sparganium antipodum.**—Swamps near Methven, Canterbury, *Dr. Gaze!*

Page

XCI. CYPERACEÆ.

- 772 **Scirpus lenticularis.**—Ascends to 4000 ft. on Mount Kakaramea, Taupo, *T. F. C.*
- 775 **S. sulcatus.**—Vicinity of Westport, *Townson!*
- 792 **Gahnia setifolia.**—Near Westport, *Townson!*
- 801 **Uncinia caespitosa.**—Chatham Islands, *Cox and Cockayne!*
- 803 **U. riparia.**—Chatham Island, *Cox and Cockayne!*
- 812 **Carex trachycarpa.**—Mount Lyell, alt. 3500 ft., *Townson!*
- 816 **C. resectans.**—Awatere River, Marlborough, *J. H. Macmahon!*
- 818 **C. leporina.**—Mount Rochfort, near Westport, *W. Townson!*
- 820 20 bis. **C. Darwinii**, *Boott. in Proc. Linn. Soc. i. (1845) 261.*—Rhizome thick, creeping, stoloniferous. Culms 1–3 ft. high, stout below, slender and drooping above, sharply triquetrous, faces concave. Leaves numerous, equalling or longer than the culms, $\frac{1}{5}$ – $\frac{2}{5}$ in. broad, margins and midrib sharply scabrid; bracts leafy, the lower far exceeding the culms. Spikelets numerous, 6–15, dark ferruginous-brown, distant, long-stalked, pendulous, $\frac{1}{2}$ –3 in. long; upper 1–3 male, solitary or the lower geminate; the remainder female but often with a few male flowers at the top, geminate or ternate, lax-flowered at the base. Glumes lanceolate or ovate-lanceolate, dark-brown with a pale keel, 1–3-nerved, cuspidate. Utricle ovate, plano-convex, 3–5-nerved on each face, minutely papillose-granulate and more or less spotted with purple, narrowed into a very short beak with an almost entire mouth. Styles 2. Nut broadly obovoid.—*Hook. f. Fl. Antarct. ii. 364, t. 145.*

CHATHAM ISLANDS: Lowland swamps near Lake Huro, *Cockayne.*

Also in South America, where it stretches from Chili to the Straits of Magellan and Fuegia. I have not seen New Zealand examples, and the above description has been drawn up from those given by Boott and Kukenthal. The latter author, who has examined Dr. Cockayne's specimens, states that they are referable to the variety *urolepis* (*C. urolepis*, Franchet), which differs from the type in the glumes being produced into awns much longer than the utricles. *C. Darwinii* comes nearer to *C. ternaria* than to any other New Zealand species, principally differing in the utricles and glumes.

Page

XCII. GRAMINEÆ.

- 847 **Isachne australis**.—Opunake (Taranaki), *Kirk*! The most southern locality known to me.
- 858 **Stipa setacea**.—I have received numerous specimens of this from various localities on the east coast of the South Island, from Marlborough to Otago. It is evidently spreading rapidly, and no doubt can be entertained of its exotic origin.
- 874 **Dichelachne sciurea**.—Vicinity of Westport, *Townson*!
- 888 **Danthonia oreophila**.—Source of Nigger Creek, Canterbury Alps, *Dr. Cockayne*.
- 894 **Arundo conspicua**.—Add to the synonyms *Agrostis Lessoniana*, Steud. Nom. ii. 41, and *A. procera*, A. Rich. Fl. Nouv. Zél. 125.
- 902 **Poa litorosa**.—In a communication made to the New Zealand Institute in October, 1905, but not yet printed, Mr. Petrie has pointed out that the *Festuca scoparia* of Hooker's Handbook, which answers to the *Poa litorosa* of this work, is really composed of two species—one the original *Festuca scoparia* of the "Flora Antarctica," which is apparently confined to the outlying islands to the south of New Zealand; the other a very different plant, occurring on the rocky coasts of southern Otago and Stewart Island, as well as on the Auckland Islands, and for which he proposes the name *Poa Astoni*. The two plants may be thus characterized:—

3. **P. Astoni**, *Petrie in Trans. N.Z. Inst.* xxxviii. (1906) *ined.*—Culms densely tufted, 12–15 in. high. Leaves equalling or exceeding the culms, very narrow, linear-filiform, gradually narrowed into an almost pungent point, closely involute, striate, glabrous; sheaths long, compressed, striate; ligules broadly triangular, acute. Panicle 2–2½ in. long, ovate or ovate-oblong, rather dense; branches short, simple or divided. Spikelets compressed, ovate-oblong, ¼ in. long, 5–6-flowered. Two outer glumes about half as long as the spikelet, subequal, broadly lanceolate, acuminate, glabrous, 3-nerved. Flowering glumes ovate-lanceolate, acuminate, keeled, strongly 5-nerved, usually with a tuft of crisped hairs on the callus and lower part of the keel, but frequently without. Palea linear-oblong, bidentate, ciliate-scabrid on the keels.—*Festuca scoparia*, *Hook. f. Handb. N.Z. Fl.* 341 (*in part, but not of Fl. Antarct.* i. 98); *Buch. N.Z. Grasses*, t. 55A.

SOUTH ISLAND: Rocky cliffs on the coast-line of Otago and Stewart Island, not uncommon. AUCKLAND ISLANDS: *T. Kirk*!

Page

- 907 12 bis. **P. litorosa**, *Cheesem.*—A tall densely tufted species, often forming tussocks 2–3 ft. high. Culms numerous, branched at the base, leafy, quite glabrous, 2–3-noded. Leaves much longer than the culms, narrow linear-filiform, gradually narrowed upwards, strongly involute for their whole length, coriaceous, glabrous, striate; sheaths very long, smooth, shining; ligules narrow, horizontal, inconspicuous. Panicle 3–5 in. long, suberect or slightly inclined, sparingly branched, few-flowered; rhachis slender, scabrid; branches scaberulous, 8–5-spiculate. Spikelets much compressed, ovate-oblong, about $\frac{1}{3}$ in. long, 4–5-flowered. Two outer glumes subequal, lanceolate, acute, 3-nerved, scabrid on the back and nerves. Flowering glumes oblong-lanceolate, obtuse or subacute, prominently 5-nerved; callus and base with a tuft of long crisped hairs, the whole surface densely minutely scaberulous. Palea a quarter shorter than the glume, bidentate, ciliate-scabrid on the keels.—*Festuca scoparia*, *Hook. f. Fl. Antarct.* i. 98.

AUCKLAND AND CAMPBELL ISLANDS: Abundant in rocky places near the sea, *Hooker, Kirk!*

Easily distinguished from *P. Astoni* by the larger size and stouter habit, larger spikelets with fewer flowers, and obtuse or subacute flowering glumes.

- 905 **P. pusilla.**—Bluff Hill and Dog Island, Foveaux Strait, *Dr. Cockayne.*
- 906 **P. dipsacea.**—Mr. Townson has collected this in several localities in the south-west of the Nelson Provincial District.
- 907 12 ter. **P. Hamiltoni**, *T. Kirk in Trans. N.Z. Inst.* xxvii. (1895) 353.—“Culms leafy to the base of the panicle, erect, 6–9 in. high. Leaves flat, spreading, exceeding the panicle; ligule ovate, laciniate, the laciniae produced into long hair-like points. Panicle 3–4 in. long, strict, narrow, lower branches 1–2 in. long. Spikelets pedicellate, 2–3-flowered; outer glumes unequal, the outermost less than half the length of the inner. Flowers never webbed at the base. Flowering glume narrow-lanceolate, 5-nerved; lodicules ovate, acute. Grain large, cylindrical.”

MACQUARIE ISLAND: *A. Hamilton.*

“A distinct species allied to *P. foliosa*, *Hook. f.*, and *P. anceps*, *Forst.*, but distinguished from both by the leaves exceeding the culms, the laciniate ligule, the smaller spikelets, and unequal flowering-glumes; also from *P. foliosa* by the longer pedicels, very short styles, and cylindrical grain.”

The above species was accidentally omitted in the body of this work. I have seen no specimens, and *Kirk's* description is not sufficiently precise to allow its systematic position to be made out with certainty.

XCIII. **FILICES.**

Page

- 936 **Hymenophyllum rufescens.** — Kelly's Hill, Westland, *Dr. Cockayne.*
- 952 **Alsophila lunulata.** — In Asa Gray's "Botany of the United States Exploring Expedition" this is stated to have been collected at the Bay of Islands—no doubt through some mistake. It is a native of Fiji, New Caledonia, Samoa, &c.
- 962 **Adiantum hispidulum.** — Add to the synonyms *A. Birkenheadii*, Moore in Gard. Chron. (1886) 648.
- 980 **Lomaria capensis.** — Mr. J. H. Macmahon sends a beautifully crested variety from the Pelorus Valley, Marlborough.
- 1005 **Nephrodium unitum.** — Piako Swamp, *H. C. Field.* (See Trans. N.Z. Inst. xxxvii. 377.)
- 1016 **Gymnogramme rutæfolia.** — Gorge of the Waimakariri, Canterbury, *Dr. Cockayne.*
- 1022 **Schizæa bifida.** — The filamentous prothallium of this species has been described by Professor A. P. W. Thomas in the Annals of Botany for 1902, in a communication entitled "An Alga-like Prothallium" (p. 165).
- 1038 **Lycopodium Drummondii.** — Outlet of Lake Tongonge, near Kaitaia, *R. H. Matthews!* This is an interesting re-discovery, the species having completely eluded the search of New Zealand botanists since it was first collected by Mr. Colenso in 1839.
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INDEX.

[Orders in capital type; genera and species accepted and described in this work in roman type; naturalised plants, synonyms, and species casually mentioned in italic type.]

	Page		Page
Abrotanella, <i>Cass.</i>	360	Aciphylla—continued.	
<i>cæspitosa</i> , <i>Petrie</i>	362	<i>Monroi</i> , <i>Hook. f.</i>	212, 1138
<i>emarginata</i> , <i>Cass.</i>	363	<i>polita</i> , <i>Cheesem.</i>	213
<i>inconspicua</i> , <i>Hook. f.</i>	362	<i>simplex</i> , <i>Petrie</i>	214
<i>linearis</i> , <i>Bergg.</i>	361	<i>squarrosa</i> , <i>Forst.</i>	209, 1138
<i>muscosa</i> , <i>T. Kirk</i>	363	<i>Townsoni</i> , <i>Cheesem.</i>	1138
<i>pusilla</i> , <i>Hook. f.</i>	362	<i>Traillii</i> , <i>T. Kirk</i>	211
<i>rosulata</i> , <i>Hook. f.</i>	361	<i>Traversii</i> , <i>Hook. f.</i>	210
<i>spathulata</i> , <i>Hook. f.</i>	361	<i>Ackama</i> , <i>A. Cunn.</i>	137
<i>Acacia dealbata</i> , <i>Link.</i>	1072	<i>rosæfolia</i> , <i>A. Cunn.</i>	137
<i>decurrens</i> , <i>Willd.</i>	1072	<i>Aconitum Napellus</i> , <i>Linn.</i>	1063
<i>Acæna</i> , <i>Linn.</i>	130, 1073	<i>Acrophorus hispidus</i> , <i>Moore</i>	956
<i>adscendens</i> , <i>Vahl.</i>	132	<i>Acrostichum barbarum</i> , <i>Linn.</i>	1024
<i>Buchanani</i> , <i>Hook. f.</i>	133	<i>Actinotus</i> , <i>Labill.</i>	204
<i>depressa</i> , <i>T. Kirk</i>	132	<i>bellidioides</i> , <i>Benth.</i>	204
<i>glabra</i> , <i>Buch.</i>	133	<i>novæ-zealandiæ</i> , <i>Petrie</i>	204, 1138
<i>Huttoni</i> , <i>R. Br.</i>	131	<i>Adenochilus</i> , <i>Hook. f.</i>	691
<i>inermis</i> , <i>Hook. f.</i>	132	<i>gracilis</i> , <i>Hook. f.</i>	691
<i>macrantha</i> , <i>Col.</i>	131	<i>Nortoni</i> , <i>Fitzg.</i>	691
<i>microphylla</i> , <i>Hook. f.</i>	132	<i>Adiantum</i> , <i>Linn.</i>	960
<i>novæ-zealandiæ</i> , <i>T. Kirk</i>	131	<i>æthiopicum</i> , <i>Linn.</i>	960
<i>ovina</i> , <i>A. Cunn.</i>	1073	<i>affine</i> , <i>Willd.</i>	963
<i>sanguisorbæ</i> , <i>Vahl.</i>	131, 1136	<i>affine</i> , <i>Hook.</i>	961
<i>Achillea millefolium</i> , <i>Linn.</i>	1076	<i>assimile</i> , <i>Swartz</i>	961
<i>tanacetifolia</i> , <i>All.</i>	1076	<i>Birkenheadii</i> , <i>Moore</i>	1157
<i>Achnatherum conspicuum</i> , <i>Beauv.</i>	894	<i>clavatum</i> , <i>Forst.</i>	956
<i>Achras costata</i> , <i>Endl.</i>	436	<i>cuneatum</i> , <i>Forst.</i>	959
<i>novæ-zealandica</i> , <i>F. Muell.</i>	436	<i>Cunninghamii</i> , <i>Hook.</i>	963
<i>Acianthus</i> , <i>R. Br.</i>	684	<i>diaphanum</i> , <i>Blume</i>	961
<i>rivularis</i> , <i>A. Cunn.</i>	1152	<i>formosum</i> , <i>R. Br.</i>	962
<i>Sinclairii</i> , <i>Hook. f.</i>	684	<i>formosum</i> , <i>A. Rich.</i>	963
<i>Aciphylla</i> , <i>Forst.</i>	207	<i>fulvum</i> , <i>Raoul</i>	964
<i>Colensoi</i> , <i>Hook. f.</i>	208, 1138	<i>hispidulum</i> , <i>Swartz</i>	962, 1157
<i>crenulata</i> , <i>Armstr.</i>	211	<i>pedatum</i> , <i>Forst.</i>	962
<i>decipiens</i> , <i>Hook. f. & Benth.</i>	223	<i>polymorphum</i> , <i>Col.</i>	961
<i>Dieffenbachii</i> , <i>T. Kirk</i>	214, 1139	<i>pubescens</i> , <i>Schkuhr.</i>	962
<i>Dobsoni</i> , <i>Hook. f.</i>	213	<i>pullum</i> , <i>Col.</i>	963
<i>Hectori</i> , <i>Buch.</i>	211	<i>setulosum</i> , <i>J. Smith</i>	961
<i>Hookeri</i> , <i>T. Kirk</i>	210, 1138	<i>trigonum</i> , <i>Labill.</i>	961
<i>Kirkii</i> , <i>Buch.</i>	212	<i>tuberosum</i> , <i>Col.</i>	961
<i>Lyallii</i> , <i>Hook. f.</i>	211, 1138	<i>viridescens</i> , <i>Col.</i>	964
<i>montana</i> , <i>Armstr.</i>	211		

	Page		Page
<i>Agalmanthus umbellatus</i> , Homb. & Jacq.	163	<i>Aira antarctica</i> , Forst.	880
<i>Agathis, Salisb.</i>	645	<i>australis</i> , Raoul	876
<i>australis, Salisb.</i>	645	<i>cæspitosa</i> , Linn.	876
<i>Agave americana</i> , Linn.	1088	<i>caryophyllea</i> , Linn.	1091
<i>rigida</i> , Mill.	700	<i>Kingii</i> , Hook. f.	876
<i>Ageratum</i> , Linn.	271	<i>præcox</i> , Linn.	1091
<i>conyzoides</i> , Linn.	271	<i>Albinea orisigenesa</i> , Homb. & Jacq.	296
<i>Agropyrum, Gaertn.</i>	921	<i>Albizzia lophantha</i> , Benth.	1072
<i>Coxii</i> , Petrie	920	<i>Alchemilla arvensis</i> , Scop.	1073
<i>Enysii, T. Kirk</i>	922	<i>Alectryon, Gaertn.</i>	103
<i>multiflorum, T. Kirk</i>	921	<i>excelsum, Gaertn.</i>	103
<i>pectinatum</i> , Beauv.	1093	<i>Alepis flavida</i> , Van Tiegh.	1149
<i>repens</i> , Beauv.	1093	<i>polychroa</i> , Van Tiegh.	1149
<i>scabrum, Beauv.</i>	923	<i>Alepyrum pallidum</i> , Hook. f.	757
<i>Youngii, Cheesem.</i>	923	<i>Aleurites, Forst.</i>	629
<i>Agrostis, Linn.</i>	862	<i>moluccana, Willd.</i>	629
<i>amula, R. Br.</i>	868	<i>triloba</i> , Forst.	629
<i>alba</i> , Linn.	862, 1090	ALISMACEÆ	1088
<i>antarctica</i> , Hook. f.	863	<i>Alisma Plantago</i> , Linn.	1088
<i>aucklandica</i> , Hook. f.	876	<i>Allantodia australis</i> , R. Br.	996
<i>avenacea</i> , Gmel.	868	<i>tenera</i> , R. Br.	996
<i>avenoides</i> , Hook. f.	871	<i>Allium vineale</i> , Linn.	1088
<i>Billardieri, R. Br.</i>	870	<i>Allosurus rotundifolius</i> , Kunze	969
<i>canina</i> , Linn.	865	<i>scaberulus</i> , Presl.	971
<i>canina</i> , Hook. f.	865	<i>Aloe latifolia</i> , Haw.	1088
<i>conspicua</i> , Roem. & Schult.	894	<i>Alopecurus, Linn.</i>	859
<i>crinita</i> , R. Br.	874	<i>agrestis</i> , Linn.	860, 1090
<i>Dyeri, Petrie</i>	864	<i>geniculatus, Linn.</i>	859
<i>Forsteri</i> , Roem. & Schult.	868	<i>pratensis</i> , Linn.	860, 1090
<i>gelida</i> , F. Muell.	864	<i>Alseuosmia, A. Cunn.</i>	240
<i>leptostachya</i> , Hook. f.	869	<i>atriplicifolia</i> , A. Cunn.	241
<i>Lessoniana</i> , Steud.	1155	<i>Banksii, A. Cunn.</i>	241
<i>Lyallii</i> , Hook. f.	869	<i>Hookeria</i> , Col.	241
<i>magellanica</i> , Lam.	862	<i>Ilex, A. Cunn.</i>	241
<i>Muelleri, Benth.</i>	864	<i>ligustriifolia</i> , A. Cunn.	241
<i>multicaulis</i> , Hook. f.	863	<i>linariifolia</i> , A. Cunn.	241
<i>muscosa</i> , T. Kirk	863	<i>macrophylla</i> , A. Cunn.	240
<i>ovata</i> , Forst.	859	<i>palæiformis</i> , A. Cunn.	241
<i>parviflora</i> , R. Br.	866	<i>pusilla</i> , Col.	241
<i>perennans</i> , Tuckerm.	866	<i>quercifolia</i> , A. Cunn.	240
<i>Petriei, Hack.</i>	865	<i>Alsophila, R. Br.</i>	952
<i>pilosa</i> , A. Rich.	869	<i>Colensoi, Hook. f.</i>	952
<i>pilosa</i> , A. Cunn.	885	<i>lunulata</i> , R. Br.	1157
<i>procera</i> , A. Rich.	1155	<i>Alternanthera, Forsk.</i>	576
<i>quadriseta</i> , R. Br.	872	<i>sessilis, R. Br.</i>	577
<i>scabra</i> , Benth.	866	<i>denticulata</i> , R. Br.	577
<i>scabra</i> , Willd.	866	<i>Althæa officinalis</i> , Linn.	1068
<i>scabra</i> , R. Br.	873	<i>Alyssum calycinum</i> , Linn.	1064
<i>sciurea</i> , R. Br.	874	<i>maritimum</i> , Lam.	1064
<i>setifolia</i> , Hook. f.	870	AMARANTACEÆ	576, 1085
<i>Solandri, F. Muell.</i>	868	<i>Amaranthus Blitum</i> , Linn.	1085
<i>Spencei</i> , T. Kirk	863	<i>caudatus</i> , Linn.	1085
<i>striata</i> , Col.	869	<i>hybridus</i> , Linn.	1085
<i>subulata</i> , Hook. f.	864	<i>retroflexus</i> , Linn.	1085
<i>tenella</i> , Petrie	866	<i>viridis</i> , Linn.	1085
<i>vulgaris</i> , With.	862, 1090	AMARYLLIDÆ	700, 1088, 1153
<i>Youngii</i> , Hook. f.	871	<i>Ammi majus</i> , Linn.	1074
		<i>Ammophila arundinacea</i> , Host	1090

	Page		Page
AMPELIDEÆ	1069	Apium—continued.	
Amphibromus, Nees	882	<i>leptophyllum</i> , F. Muell.	205, 1074
<i>fluitans</i> , T. Kirk	882	<i>prostratum</i> , Labill. ..	205
<i>Neesii</i> , Steud.	883	APOCYNACEÆ	439, 1080
<i>Amsinckia angustifolia</i> , Lehm. ..	1080	<i>Aponogeton distachyum</i> , Thunb. ..	1089
<i>Amygdalus Persica</i> , Linn.	1071	<i>Aquilegia vulgaris</i> , Linn. ..	1063
ANACARDIACEÆ	104, 1135	<i>Arabis fastigiata</i> , Hook. f. ..	35
<i>Anacharis alsinastrium</i> , Bab. ..	1089	<i>gigantea</i> , Hook.	34
<i>Anagallis arvensis</i> , Linn.	1080	<i>hirsuta</i> , Scop.	1064
<i>Anagosperra</i> , Wettst.	557	ARACEÆ	1088
<i>dispermum</i> , Wettst.	557	<i>Aralia</i> , Linn.	227
<i>Anchusa spathulata</i> , R. Br.	467	<i>crassifolia</i> , Soland.	235
<i>Ancistrum anserinæfolium</i> , Forst. ..	131	<i>heterophylla</i> , A. Cunn. ..	1140
<i>decumbens</i> , Gaertn.	131	<i>Lessonii</i> , Hook. f.	1140
<i>diandrum</i> , Forst.	131	<i>Lyallii</i> , T. Kirk	227, 1139
<i>Andromeda rupestris</i> , Forst.	407	<i>polaris</i> , Homb. & Jacq. ..	227
<i>Andropogon annulatus</i> , Forsk. ..	1089	<i>Schefflera</i> , Spreng.	233
<i>Androstoma empetrifolia</i> , Hook. f. ..	412	ARALIACEÆ	225, 1075, 1139
<i>Angelica</i> , Linn.	222	<i>Archeria</i> , Hook. f.	416
<i>decipiens</i> , Hook. f.	223	<i>racemosa</i> , Hook. f.	417
<i>Dieffenbachii</i> , Benth. & Hook. f. ..	1139	<i>Traversii</i> , Hook. f.	417
<i>geniculata</i> , Hook. f.	224	<i>Arctium Lappa</i> , Linn.	1078
<i>Gingidium</i> , Hook. f.	222	<i>Areca Baueri</i> , Hook. f.	740
<i>rosæfolia</i> , Hook.	224	<i>sapida</i> , Soland.	740
<i>trifoliolata</i> , Cockayne	223, 1139	<i>sapida</i> , Endl.	740
<i>Anguillaria novæ-zealandiæ</i> , Hook. f. ..	721	<i>Arenaria media</i> , Linn.	70
<i>Anisotome antipoda</i> , Hook. f.	216	<i>serpyllifolia</i> , Linn.	1067
<i>aromatica</i> , Hook. f.	221	<i>Aristolelia</i> , L'Herit.	83
<i>geniculata</i> , Hook. f.	224	<i>Colensoi</i> , Hook. f.	84
<i>Gingidium</i> , Hook. f.	223	<i>erecta</i> , Buch.	84
<i>intermedia</i> , Hook. f.	217	<i>fruticosa</i> , Hook. f.	84
<i>latifolia</i> , Hook. f.	216	<i>racemosa</i> , Hook. f.	83, 1135
<i>Lyallii</i> , Hook. f.	217	<i>Arnica operina</i> , Forst.	281
<i>rosæfolia</i> , Hook. f.	224	<i>Arrhenatherum avenaceum</i> , Beauv. ..	1091
<i>Anogramme leptophylla</i> , Link.	1016	<i>Artemisia absinthium</i> , Linn. ..	1077
<i>Anthemis arvensis</i> , Linn.	1077	<i>Arthropodium</i> , R. Br.	718
<i>Cotula</i> , Linn.	1077	<i>candidum</i> , Raoul	719
<i>nobilis</i> , Linn.	1077	<i>cirrhatum</i> , R. Br.	719
<i>Anthericum cirrhatum</i> , Forst.	719	<i>ramulosum</i> , Col.	719
<i>Hookeri</i> , Col.	718	<i>reflexum</i> , Col.	719
<i>Rossii</i> , Hook. f.	718	<i>Arthropteris filipes</i> , Moore	1011
<i>Anthistiria ciliata</i> , Linn. f.	1089	<i>tenella</i> , I. Smith	1011
<i>imberbis</i> , Retz.	1089	<i>Arundo</i> , Linn.	893
<i>Antholyza æthiopica</i> , Linn.	1088	<i>australis</i> , A. Rich.	894
<i>Anthophyllum Urvillei</i> , Steud.	777	<i>conspicua</i> , Forst.	893, 1155
<i>Anthoxanthum crinitum</i> , Forst.	874	<i>fulvida</i> , Buch.	894
<i>odoratum</i> , Linn.	1090	<i>Kakao</i> , Steud.	894
<i>Anthyllis vulneraria</i> , Linn.	1071	<i>Ascarina</i> , Forst.	597
<i>Antiaris toxicaria</i> , Lesch.	631	<i>lanceolata</i> , Hook. f.	597
<i>Antirrhinum Orontium</i> , Linn.	1082	<i>lucida</i> , Hook. f.	598
<i>Apeiba australis</i> , A. Rich.	82	<i>rubricaulis</i> , Solms.	598
<i>Apera arundinacea</i> , Hook. f.	857	ASCLEPIADEÆ	1080
<i>purpurascens</i> , Col.	857	<i>Asparagus officinalis</i> , Linn. ..	1088
Apium, Linn.	204, 1074	<i>Asperella</i> , Humb.	924
<i>australe</i> , Thou.	205	<i>aristata</i> , Petrie	922
<i>filiforme</i> , Hook.	205	<i>gracilis</i> , T. Kirk	924
<i>graveolens</i> , Linn.	205, 1074	<i>lævis</i> , Petrie	924

	Page		Page
<i>Asperula</i> , Linn. ..	266	<i>Asplenium</i> —continued.	
<i>aristifera</i> , Col. ..	267	<i>Schkuhrii</i> , Hook. ..	996
<i>fragrantissima</i> , Armstr. ..	267	<i>scleroprium</i> , Homb. & Jacq. ..	991
<i>perpusilla</i> , Hook. f. ..	267	<i>Shuttleworthianum</i> , Kunze ..	995
<i>Asphodelus fistulosus</i> , Linn. ..	1088	<i>symmetricum</i> , Col. ..	994
<i>Aspidium</i> , Swartz ..	996	<i>tremulum</i> , Homb. and Jacq. ..	993
<i>aculeatum</i> , Swartz ..	997	<i>Trichomanes</i> , Linn. ..	988
<i>aristatum</i> , Swartz ..	1001	<i>triste</i> , Raoul. ..	993
<i>capense</i> , Willd. ..	1000	<i>umbrosum</i> , J. Smith ..	995
<i>coriaceum</i> , A. Rich. ..	999	<i>Astelia</i> , Banks & Soland. ..	708
<i>coriaceum</i> , Swartz ..	1000	<i>albicans</i> , Col. ..	713
<i>cordifolium</i> , Swartz ..	1007	<i>Banksii</i> , A. Cunn. ..	711, 1153
<i>Cunninghamianum</i> , Col. ..	1000	<i>Cunninghamii</i> , Hook. f. ..	710
<i>cystostegia</i> , Hook. ..	1000	<i>fragrans</i> , Col. ..	714
<i>decompositum</i> , Spreng. ..	1003	<i>graminifolia</i> , Col. ..	711
<i>exaltatum</i> , Swartz ..	1007	<i>grandis</i> , Hook. f. ..	714
<i>hispidum</i> , Swartz ..	1005	<i>hastata</i> , Col. ..	713
<i>mohrioides</i> , Bory. ..	998	<i>Hookeriana</i> , T. Kirk ..	711
<i>molle</i> , Swartz ..	1006	<i>linearis</i> , Hook. f. ..	710
<i>oculatum</i> , Hook. ..	999	<i>microsperma</i> , Col. ..	713
<i>pennigerum</i> , Swartz ..	1009	<i>minima</i> , Col. ..	710
<i>perelegans</i> , Col. ..	998	<i>nervosa</i> , Banks & Sol. ..	713
<i>proliferum</i> , R. Br. ..	998	<i>Petriei</i> , Cockayne ..	714
<i>pulcherrimum</i> , Col. ..	998	<i>planifolia</i> , Col. ..	1153
<i>Richardi</i> , Hook. ..	999	<i>polyneuron</i> , Col. ..	711
<i>unitum</i> , Swartz ..	1005	<i>Solandri</i> , A. Cunn. ..	712, 1153
<i>velutinum</i> , A. Rich. ..	1004	<i>spicata</i> , Col. ..	1153
<i>vestitum</i> , Swartz ..	998	<i>subrigida</i> , Col. ..	1153
<i>Waikarense</i> , Col. ..	998	<i>trinervia</i> , T. Kirk ..	712, 1153
<i>zerophyllum</i> , Col. ..	998	<i>Aster Celmisia</i> , F. Muell. ..	314
<i>Asplenium</i> , Linn. ..	986	<i>coriaceus</i> , Forst. ..	310
<i>adiantoides</i> , Raoul ..	992, 994	<i>furfuraceus</i> , A. Rich. ..	284
<i>anomodum</i> , Col. ..	991	<i>holosericeus</i> , Forst. ..	302
<i>apice-dentatum</i> , Homb. & Jacq. ..	991	<i>imbricatus</i> , Linn. ..	1076
<i>australe</i> , Brack. ..	995	<i>Astorganthus Huegelii</i> , Endl. ..	95
<i>Brownii</i> , J. Smith ..	996	<i>Atherosperma novæ-zealandiæ</i> , Hook. f. ..	601
<i>bulbiferum</i> , Forst. ..	993	<i>Athyrium umbrosum</i> , Presl. ..	996
<i>caudatum</i> , Forst. ..	989	<i>australe</i> , Presl. ..	996
<i>Colensoi</i> , Hook. f. ..	992	<i>Atriplex</i> , Linn. ..	582
<i>falcatum</i> , Lam. ..	989	<i>Billardieri</i> , Hook. f. ..	584, 1147
<i>fiabellifolium</i> , Cav. ..	988	<i>Buchanani</i> , T. Kirk ..	584
<i>flaccidum</i> , Forst. ..	994	<i>cinerea</i> , Poir. ..	583
<i>Forsterianum</i> , Col. ..	989	<i>crystallina</i> , Hook. f. ..	585
<i>gracillimum</i> , Col. ..	993	<i>Halimus</i> , Linn. ..	583
<i>heterophyllum</i> , A. Rich. ..	995	<i>patula</i> , Linn. ..	584
<i>Hookerianum</i> , Col. ..	992	<i>Atropis</i> , Rupr. ..	914
<i>japonicum</i> , Thunb. ..	996	<i>distans</i> , Griseb. ..	915, 1092
<i>laxum</i> , R. Br. ..	993	<i>novæ-zealandiæ</i> , Hack. ..	915
<i>lucidum</i> , Forst. ..	990	<i>pumila</i> , T. Kirk. ..	896, 914
<i>Lyallii</i> , Moore ..	991	<i>stricta</i> , Hack. ..	914
<i>melanolepis</i> , Col. ..	988	<i>Australina</i> , Gaud. ..	638
<i>obliquum</i> , Forst. ..	991	<i>hispidula</i> , Col. ..	639
<i>obtusatum</i> , Forst. ..	990	<i>novæ-zealandiæ</i> , Hook. f. ..	639
<i>ornatum</i> , Col. ..	992	<i>pusilla</i> , Gaud. ..	639
<i>polyodon</i> , Forst. ..	989	<i>Avena antarctica</i> , Roem. & Schult. ..	880
<i>Raoulii</i> , Mett. ..	992, 994	<i>fatua</i> , Linn ..	1091
<i>Richardi</i> , Hook. f. ..	994		

	Page		Page
<i>Avena</i> —continued.		<i>Boehmeria</i> —continued.	
<i>filiformis</i> , Forst. ..	868	<i>calophleba</i> , C. Moore ..	637
<i>pubescens</i> , Huds. ..	1091	<i>dealbata</i> , Cheesem. ..	637
<i>quadriseta</i> , Labill ..	872	<i>nivea</i> , Gaud. ..	631
<i>sativa</i> , Linn. ..	1091	BORAGINACEÆ ..	457, 1080, 1145
<i>strigosa</i> , Schreb. ..	1091	<i>Borago officinalis</i> , Linn. ..	1080
<i>Avicennia</i> , Linn. ..	566	<i>Bossia scolopendrina</i> , A. Rich. ..	113
<i>officinalis</i> , Linn. ..	566	<i>Botrychium</i> , Swartz ..	1028
<i>resinifera</i> , Forst. ..	566	<i>australe</i> , R. Br. ..	1029
<i>tomentosa</i> , Jacq. ..	566	<i>biforme</i> , Col. ..	1029
<i>Azolla</i> , Linn. ..	1031	<i>cicutarium</i> , Hook. f. ..	1029
<i>filiculoides</i> , Lam. ..	1031	<i>dissectum</i> , Muhl. ..	1029
<i>rubra</i> , R. Br. ..	1031	<i>lunaria</i> , Swartz ..	1028
<i>Azorella</i> , Lam. ..	199	<i>ternatum</i> , Swartz ..	1029
<i>exigua</i> , Benth. & Hook. f. ..	200	<i>virginianum</i> , Hook. f. ..	1029
<i>Haastii</i> , Benth. & Hook. f. ..	201	<i>Botryodendrum Sinclairii</i> , Hook. f. ..	232
<i>Hookeri</i> , Drude ..	1137	<i>Bowlesia geniculata</i> , Spreng. ..	224
<i>hydrocotyloides</i> , Benth. & Hook. f. ..	202	<i>Brachycome</i> , Cass. ..	274
<i>nitens</i> , Petrie ..	202	<i>lineata</i> , T. Kirk ..	275
<i>pallida</i> , T. Kirk ..	202	<i>odorata</i> , Hook. f. ..	276
<i>radians</i> , Drude ..	1137	<i>pinnata</i> , Hook. f. ..	275
<i>reniformis</i> , Asa Gray ..	200, 1137	<i>polita</i> , T. Kirk ..	277
<i>Roughii</i> , Benth. & Hook. f. ..	201	<i>radicata</i> , Hook. f. ..	276
<i>Selago</i> , Hook. f. ..	200	<i>simplicifolia</i> , Armstr. ..	275
<i>trifoliolata</i> , Hook. f. ..	203, 1137	<i>Sinclairii</i> , Hook. f. ..	276
<i>trifoliolata</i> , Clos. ..	1137	<i>Thomsoni</i> , T. Kirk ..	277, 1141
BALANOPHOREÆ ..	625	<i>Brachyglottis</i> , Forst. ..	366
<i>Banksia Gnidia</i> , Forst. ..	609	<i>Rangiora</i> , Buch. ..	367, 1142
<i>Barbarea praecox</i> , R. Br. ..	1064	<i>Rani</i> , A. Cunn. ..	287
<i>Bartsia viscosa</i> , Linn. ..	1033	<i>repanda</i> , Forst. ..	367
<i>Baumea loculata</i> , Boeck. ..	786	<i>rotundifolia</i> , Forst. ..	383
<i>rubiginosa</i> , Boeck. ..	786	<i>Brassica adpressa</i> , Boiss. ..	1065
<i>Beilschmiedia</i> , Nees. ..	601	<i>alba</i> , Boiss. ..	1065
<i>Tarairi</i> , Benth. & Hook. f. ..	602	<i>campestris</i> , Linn. ..	1065
<i>Tawa</i> , Benth. & Hook. f. ..	602	<i>Napus</i> , Linn. ..	1065
<i>Bellis perennis</i> , Linn. ..	1076	<i>nigra</i> , Koch. ..	1065
<i>Beta vulgaris</i> , Linn. ..	1035	<i>oleracea</i> , Linn. ..	1065
<i>Bidens</i> , Linn. ..	349	<i>rapa</i> , Linn. ..	1065
<i>aurantiacus</i> , Col. ..	349	<i>Sinapistrum</i> , Boiss. ..	1065
<i>pilosa</i> , Linn. ..	349	<i>Brathys Forsteri</i> , Spach ..	75
<i>Blechnum alpinum</i> , Mett. ..	980	<i>Braya novæ-zealandiæ</i> , Hook. f. ..	37
<i>Banksii</i> , Mett. ..	979	<i>Briza maxima</i> , Linn. ..	1091
<i>capense</i> , Schlecht. ..	981	<i>minor</i> , Linn. ..	1091
<i>discolor</i> , Mett. ..	976	<i>Bromus</i> , Linn. ..	920
<i>fluviale</i> , Mett. ..	983	<i>antarcticus</i> , Hook. f. ..	886
<i>Fraseri</i> , Mett. ..	984	<i>arenarius</i> , Labill. ..	920
<i>lanceolatum</i> , Sturm ..	978	<i>arvensis</i> , Linn. ..	1093
<i>membranaceum</i> , Mett. ..	984	<i>australis</i> , R. Br. ..	921
<i>nigrum</i> , Mett. ..	983	<i>commutatus</i> , Schrad. ..	1093
<i>Patersoni</i> , Mett. ..	976	<i>erectus</i> , Huds. ..	1092
<i>reptans</i> , Christ ..	982	<i>madritensis</i> , Linn. ..	1092
<i>vulcanicum</i> , Christ ..	977	<i>mollis</i> , Linn. ..	921, 1092
<i>Blitum carinatum</i> , Moq. ..	582	<i>patulus</i> , Mert. & Koch. ..	1093
<i>glandulosum</i> , Moq. ..	582	<i>racemosus</i> , Linn. ..	1092
<i>Boehmeria</i> , Jacq. ..	637	<i>sterilis</i> , Linn. ..	921, 1092
<i>australis</i> , Endl. ..	637	<i>tectorum</i> , Linn. ..	1092
		<i>unioloides</i> , H. B. K. ..	1093

	Page		Page
<i>Bulbinella</i> , Kunth.	717	<i>Canavalia</i> , D.C.	122
<i>Hookeri</i> , Benth. & Hook. f.	717	<i>obtusifolia</i> , D.C.	1087
<i>Rossii</i> , Benth. & Hook. f.	717	<i>Canna indica</i> , Linn.	1065
<i>Bulbophyllum</i> , Thouars	663	<i>Camelina sativa</i> , Crantz	402
<i>exiguum</i> , Buch.	664	<i>Campanula gracilis</i> , Forst.	403
<i>ichthyostomum</i> , Col.	665	<i>saxicola</i> , R. Br.	1079
<i>pygmæum</i> , Lindl.	664	<i>Trachelium</i> , Linn.	396, 1079, 1143
<i>tuberculatum</i> , Col.	664	CAMPANULACEÆ	239, 1075
<i>Bulbharda moschata</i> , D'Urv.	140	CAPRIFOLIACEÆ	37, 1065
<i>Bupleurum rotundifolium</i> , Linn.	1074	<i>bursa-pastoris</i> , Mœnch.	37, 1065
		<i>elliptica</i> , C. A. Mey.	37
<i>Caladenia</i> , R. Br.	687	<i>procumbens</i> , Fries	32
<i>bifolia</i> , Hook. f.	688	<i>Cardamine</i> , Linn.	34
<i>Lyallii</i> , Hook. f.	688	<i>bilobata</i> , T. Kirk	33
<i>macrophylla</i> , Col.	689	<i>corymbosa</i> , Hook. f.	33
<i>minor</i> , Hook. f.	688	<i>debilis</i> , Banks & Soland.	33
<i>variegata</i> , Col.	688	<i>depressa</i> , Hook. f.	34
<i>Calamagrostis conspicua</i> , Gmel.	894	<i>divaricata</i> , Hook. f.	53
<i>Calandrinia caulescens</i> , H. B. K.	1068	<i>Enysii</i> , Cheesem.	34
<i>Calceolaria</i> , Linn.	483	<i>fastigiata</i> , Hook. f.	32
<i>albula</i> , Col.	484	<i>hirsuta</i> , Linn.	35
<i>repens</i> , Hook. f.	484	<i>latesiliqua</i> , Cheesem.	33
<i>Sinclairii</i> , Hook.	483	<i>stellata</i> , Hook. f.	34
<i>Sturmii</i> , Col.	484	<i>stylosa</i> , D.C.	1078
<i>Calea leptophylla</i> , Forst.	345	<i>Carduus nutans</i> , Linn.	1078
<i>Caleana</i> , R. Br.	676	<i>pycnocephalus</i> , Linn.	805, 1089
<i>minor</i> , R. Br.	677	<i>Carex</i> , Linn.	810
<i>Calendula officinalis</i> , Linn.	1078	<i>acicularis</i> , Boott	814
<i>pumila</i> , Forst.	272	<i>appressa</i> , R. Br.	810
<i>Callitriche</i> , Linn.	157	<i>Archeri</i> , Boott	831
<i>antarctica</i> , Engelm.	158	<i>australis</i> , Boeck.	830
<i>macropteryx</i> , Hegelm.	158	<i>australis</i> , T. Kirk	826
<i>microphylla</i> , Col.	158	<i>Berggreni</i> , Petrie	833
<i>Muelleri</i> , Sond.	158	<i>breviculmis</i> , R. Br.	834
<i>obtusangula</i> , Hegelm.	159	<i>Brownii</i> , Tuckerm.	824
<i>verna</i> , Linn.	158	<i>Buchanani</i> , Berggr.	819
<i>Callixene marginata</i> , Lam.	704	<i>cæspitosa</i> , R. Br.	835
<i>melalantha</i> , Col.	704	<i>cataractæ</i> , R. Br.	829
<i>parviflora</i> , Hook. f.	704	<i>Cheesemanii</i> , Petrie	1089
<i>Calochilus</i> , R. Br.	685	<i>chlorantha</i> , R. Br.	836
<i>campestris</i> , R. Br.	686	<i>cinnamomea</i> , Cheesem.	825
<i>paludosus</i> , R. Br.	686	<i>cirrrosa</i> , Berggr.	836
<i>Calorophus elongatus</i> , Labill.	762	<i>Cockayniana</i> , Kuk.	817
<i>minor</i> , Hook. f.	762	<i>collata</i> , Boott	815
<i>Calosciadium antipodum</i> , Endl.	216	<i>comans</i> , Berggr.	827
<i>latifolium</i> , Endl.	216	<i>cryptocarpa</i> , Cheesem.	828
<i>Calotis lappulacea</i> , Benth.	1076	<i>Dallii</i> , T. Kirk	1154
<i>Caltha</i> , Linn.	27	<i>Darwinii</i> , Boott	837
<i>introloba</i> , F. Muell.	28	<i>debilis</i> , Forst.	817
<i>marginata</i> , Col.	28	<i>debilis</i> , T. Kirk	827
<i>novæ-zealandiæ</i> , Hook. f.	28	<i>decurtata</i> , Cheesem.	823
<i>obtusa</i> , Cheesem.	28	<i>devia</i> , Cheesem.	822
<i>Calystegia</i> , R. Br.	475	<i>dipsacea</i> , Berggr.	830
<i>marginata</i> , R. Br.	477	<i>dissita</i> , Soland.	809, 1089
<i>sepium</i> , R. Br.	475	<i>divisa</i> , Huds.	
<i>Soldanella</i> , R. Br.	476		
<i>tuguriorum</i> , R. Br.	476		

	Page		Page
<i>Carex</i> —continued.		<i>Carex</i> —continued.	
<i>echinata</i> , Murr. ..	817	<i>secta</i> , Boott. . .	815
<i>fascicularis</i> , Soland. ..	838	<i>semi-Forsteri</i> , C. B. Clarke ..	836
<i>flacca</i> , Schreb. ..	809, 1089	<i>sexspicata</i> , Col. ..	837
<i>flagellifera</i> , Col. ..	824	<i>Sinclairii</i> , Boott ..	820
<i>flava</i> , Linn. ..	835	<i>smaragdina</i> , Col. ..	816
<i>Forsteri</i> , Wahl. ..	837	<i>Solandri</i> , Boott ..	831
<i>Forsteri</i> , Boott ..	836	<i>spinirostris</i> , Col. ..	835
<i>Forsteri</i> , Hook. f. ..	838	<i>stellulata</i> , Good. ..	817
<i>Gaudichaudiana</i> , Kunth ..	818	<i>striata</i> , R. Br. ..	834
<i>geminata</i> , Schkuhr ..	820	<i>subdola</i> , Boott ..	819
<i>glauca</i> , Scop. ..	809, 1089	<i>tenax</i> , Berggr. ..	825
<i>Goyeni</i> , Petrie ..	821	<i>teretiuscula</i> , Good. ..	813
<i>Haastiana</i> , Boeck. ..	809	<i>ternaria</i> , Forst. ..	820
<i>Hectori</i> , Petrie ..	826	<i>testacea</i> , Soland. ..	822
<i>inconspicua</i> , Col. ..	810	<i>Thomsoni</i> , Petrie ..	811
<i>incrassata</i> , Sol. ..	833	<i>trachycarpa</i> , Cheesem. ..	812, 1154
<i>inversa</i> , R. Br. ..	816	<i>Traversii</i> , T. Kirk ..	828
<i>kaloides</i> , Petrie ..	813	<i>trifida</i> , Cav. ..	833
<i>Kirkii</i> , Petrie ..	811	<i>uncifolia</i> , Cheesem. ..	827
<i>Krullii</i> , Boeck. ..	809	<i>urolepis</i> , Franch. ..	1154
<i>lagopina</i> , Wahl. ..	818	<i>vaccilans</i> , Soland. ..	835
<i>Lambertiana</i> , Boott ..	831	<i>ventosa</i> , C. B. Clarke ..	832
<i>leporina</i> , Linn. ..	818, 1154	<i>virgata</i> , Soland. ..	814
<i>littoralis</i> , Petrie ..	830	<i>viridis</i> , Petrie ..	812
<i>littorea</i> , Labill. ..	834	<i>vulgaris</i> , Boott ..	819
<i>litorosa</i> , Bail. ..	830	<i>Wakatipu</i> , Petrie ..	823
<i>longeacuminata</i> , Col. ..	831	<i>Carmichaelia</i> , R. Br. ..	109
<i>longiculmis</i> , Petrie ..	832	<i>acuminata</i> , T. Kirk ..	117
<i>longifolia</i> , R. Br. ..	809, 1089	<i>augustata</i> , T. Kirk ..	116
<i>lucida</i> , Boott ..	824	<i>australis</i> , R. Br. ..	113
<i>Muelleri</i> , Petrie ..	812	<i>compacta</i> , Petrie ..	117
<i>muricata</i> , Linn. ..	809, 1089	<i>corrugata</i> , Col. ..	112
<i>muricata</i> , Cheesem. ..	812	<i>corymbosa</i> , Col. ..	117
<i>Neesiana</i> , Endl. ..	832	<i>crassicaulis</i> , Hook. f. ..	108
<i>novæ-zeelandiæ</i> , Boeck. ..	835	<i>Cunninghamii</i> , Raoul ..	113
<i>novæ-zeelandiæ</i> , Petrie ..	825	<i>curta</i> , Petrie ..	118
<i>ochrosaccus</i> , C. B. Clarke ..	831	<i>diffusa</i> , Petrie ..	114
<i>panicea</i> , Linn. ..	1089	<i>Enysii</i> , T. Kirk ..	111
<i>paniculata</i> , Linn. ..	814	<i>flagelliformis</i> , Col. ..	116
<i>Parkeri</i> , Petrie ..	818	<i>gracilis</i> , Armstr. ..	117
<i>Petriei</i> , Cheesem. ..	828	<i>grandiflora</i> , Hook. f. ..	115
<i>picta</i> , Col. ..	817	<i>Hookeri</i> , T. Kirk ..	117
<i>plesiostachys</i> , C. B. Clarke ..	829	<i>juncea</i> , Col. ..	118
<i>polyneura</i> , Col. ..	831	<i>Kirkii</i> , Hook. f. ..	117
<i>polystachya</i> , A. Rich. ..	820	<i>micrantha</i> , Col. ..	117
<i>pseudo-cyperus</i> , Linn. ..	837	<i>Monroi</i> , Hook. f. ..	112
<i>pterocarpa</i> , Petrie ..	811	<i>Muelleriana</i> , Regel ..	1136
<i>pulchella</i> , Berggr. ..	829	<i>multicaulis</i> , Col. ..	117
<i>pumila</i> , Thunb. ..	834	<i>nana</i> , Col. ..	111
<i>punctulata</i> , A. Rich. ..	837	<i>odorata</i> , Col. ..	115
<i>pyrenaica</i> , Wahl. ..	810	<i>orbiculata</i> , Col. ..	111
<i>quadrangulata</i> , Col. ..	809	<i>Petriei</i> , T. Kirk ..	113
<i>Raoulii</i> , Boott ..	821	<i>pilosa</i> , Col. ..	116
<i>recurva</i> , Schkuhr ..	837	<i>prona</i> , T. Kirk ..	119
<i>resectans</i> , Cheesem. ..	816, 1154	<i>robusta</i> , T. Kirk ..	113
<i>rubicunda</i> , Petrie ..	825	<i>subulata</i> , T. Kirk ..	114

	Page		Page
<i>Carmichaelia</i> — <i>continued</i> .		<i>Celmisia</i> — <i>continued</i> .	
<i>Suteri</i> , Col.	111	<i>linearis</i> , Armstr.	314
<i>uniflora</i> , T. Kirk	111	<i>longifolia</i> , Cass.	314, 1142
<i>violacea</i> , T. Kirk	113	<i>Lyallii</i> , Hook. f.	312
<i>virgata</i> , T. Kirk	114	<i>Mackau</i> i, Raoul	310
<i>Williamsii</i> , T. Kirk . . .	112, 1136	<i>Macmahoni</i> , T. Kirk . . .	316
<i>Carpha</i> , R. Br.	779	<i>Martini</i> , Buch.	310
<i>alpina</i> , R. Br.	779	<i>membranacea</i> , Col.	318
<i>Carpodetus</i> , Forst.	136	<i>mollis</i> , Cockayne	308
<i>dentatus</i> , Poir.	1137	<i>Monroi</i> , Hook. f.	313, 1142
<i>Forsteri</i> , Roem. & Schult. .	1137	<i>parva</i> , T. Kirk	316
<i>serratus</i> , Forst.	137, 1137	<i>perpusilla</i> , Col.	1142
<i>Carum Carvi</i> , Linn. . . .	1074	<i>petiolata</i> , Hook. f. . . .	307, 1142
<i>Petroselinum</i> , Benth. & Hook. f.	1074	<i>Petriei</i> , Cheesem.	311
<i>Carumbum polyandrum</i> , Hook. f.	630	<i>prorepens</i> , Petrie	303
CARYOPHYLLÆ	61, 1066, 1134	<i>ramulosa</i> , Hook. f. . . .	301
<i>Cassinia</i> , R. Br.	344	<i>robusta</i> , Buch.	304
<i>amœna</i> , Cheesem.	346	<i>ruahinensis</i> , Col.	308
<i>fulvida</i> , Hook. f.	346	<i>rupestris</i> , Cheesem. . . .	300
<i>leptophylla</i> , R. Br. . . .	345	<i>Rutlandii</i> , T. Kirk	307
<i>retorta</i> , A. Cunn.	345	<i>sessiliflora</i> , Hook. f. . . .	316
<i>rubra</i> , Buch.	346	<i>setacea</i> , Col.	314
<i>spathulata</i> , Col.	345	<i>Sinclairii</i> , Hook. f. . . .	306
<i>Vauvilliersii</i> , Hook. f. . .	345	<i>spectabilis</i> , Hook. f. . . .	308
<i>Cassutha</i> , Linn.	604	<i>Traversii</i> , Hook. f. . . .	306
<i>paniculata</i> , R. Br.	604	<i>verbascifolia</i> , Hook. f. . .	309
<i>Catabrosa antarctica</i> , Hook. f.	877, 878	<i>vernica</i> , Hook. f.	318
<i>Caucalis nodosa</i> , Scop. . .	1075	<i>viscosa</i> , Hook. f.	312
<i>Cedronella triphylla</i> , Moench.	1084	<i>Walkeri</i> , T. Kirk	300, 1142
<i>Celmisia</i> , Cass.	296	<i>Celsia cretica</i> , Linn. f. . .	1082
<i>Adamsii</i> , T. Kirk	313	<i>Cenchrus</i> , Linn.	849
<i>argentea</i> , T. Kirk	317	<i>anomoplexis</i> , Labill. . . .	850
<i>Armstrongii</i> , Petrie	311	<i>calyculatus</i> , Cav.	849
<i>asteliaefolia</i> , Hook. f. . . .	1142	<i>Cenia turbinata</i> , Pers. . . .	1077
<i>bellidioides</i> , Hook. f. . . .	317	<i>Centaurea Calcitrapa</i> , Linn.	1078
<i>Brownii</i> , F. R. Chapm. . . .	309	<i>Cyanus</i> , Linn.	1078
<i>Campbellensis</i> , F. R. Chapm.	318	<i>nigra</i> , Linn.	1078
<i>Chapmani</i> , T. Kirk	318	<i>solstitialis</i> , Linn.	1078
<i>cordatifolia</i> , Buch.	306	<i>Centipeda</i> , Lour.	359
<i>coriacea</i> , Hook. f.	310	<i>orbicularis</i> , Lour.	360
<i>coriacea</i> , Raoul	310	<i>Centranthus ruber</i> , D.C. . .	1075
<i>Dallii</i> , Buch.	302, 1142	CENTROLEPIDÆE	755
<i>densiflora</i> , Hook. f.	303	<i>Centrolepis</i> , Labill.	756
<i>discolor</i> , Hook. f.	304	<i>minima</i> , T. Kirk	757
<i>dubia</i> , Cheesem.	308	<i>monogyna</i> , T. Kirk	758
<i>flaccida</i> , Cockayne	310	<i>pallida</i> , Cheesem.	757
<i>Gibbsii</i> , Cheesem.	300	<i>strigosa</i> , Roem and Schult.	756
<i>glandulosa</i> , Hook. f. . . .	318	<i>viridis</i> , T. Kirk	758
<i>gracilenta</i> , Hook. f. . . .	314	<i>Cerastium amblyodontum</i> , Col.	1067
<i>graminifolia</i> , Hook. f. . . .	314	<i>glomeratum</i> , Thuill. . . .	1067
<i>Haastii</i> , Hook. f.	305	<i>triviale</i> , Link.	1067
<i>Hectori</i> , Hook. f.	315	<i>truncatulum</i> , Col.	1067
<i>hieracifolia</i> , Hook. f. . . .	303	<i>Ceratella rosulata</i> , Hook. f.	361
<i>holosericea</i> , Hook. f. . . .	302	<i>Ceratochloa unioides</i> , D.C. .	1093
<i>incana</i> , Hook. f.	304	<i>Cercodia alternifolia</i> , A. Cunn.	148
<i>laricifolia</i> , Hook. f. . . .	315	<i>erecta</i> , Murr.	148
<i>lateralis</i> , Buch.	301	<i>incana</i> , A. Cunn.	149
<i>Lindsayi</i> , Hook. f.	305	<i>Ceterach rutaeifolius</i> , Mett.	1016

	Page		Page
<i>Chaetospora axillaris</i> , R. Br. ..	782	<i>Cladium</i> , P. Browne ..	784
<i>capillacea</i> , Hook. f. ..	789	<i>articulatum</i> , R. Br. ..	786
<i>capillaris</i> , F. Muell. ..	789	<i>capillaceum</i> , C. B. Clarke ..	789
<i>concinna</i> , Hook. f. ..	784	<i>complanatum</i> , Berggr. ..	785
<i>imberbis</i> , R. Br. ..	783	<i>Gunnii</i> , Hook. f. ..	788
<i>nitens</i> , R. Br. ..	783	<i>Huttoni</i> , T. Kirk ..	787
<i>pauciflora</i> , Hook. f. ..	782	<i>juncum</i> , R. Br. ..	788
<i>tenax</i> , Hook. f. ..	781	<i>gahnoides</i> , Col. ..	785
<i>Tendo</i> , Hook. f. ..	781	<i>glomeratum</i> , R. Br. ..	786
<i>Cheilanthes</i> , Swartz ..	966	<i>laxiflorum</i> , Hook. f. ..	788
<i>ambigua</i> , A. Rich. ..	965	<i>Sinclairii</i> , Hook. f. ..	785
<i>arborescens</i> , Swartz ..	965	<i>teretifolium</i> , R. Br. ..	787
<i>erecta</i> , Col. ..	968	<i>Vauthiera</i> , C. B. Clarke ..	788
<i>Kirkii</i> , Armstr. ..	967	<i>xanthocarpum</i> , F. Muell. ..	794
<i>pellucida</i> , Col. ..	965	<i>Claytonia</i> , Linn. ..	71, 1068
<i>Sieberi</i> , R. Br. ..	967	<i>australasica</i> , Hook. f. ..	71, 1135
<i>tenuifolia</i> , Swartz ..	967	<i>calycina</i> , Col. ..	1135
<i>venosa</i> , Col. ..	967	<i>perfoliata</i> , Donn. ..	1067
<i>Chelidonium majus</i> , Linn. ..	1064	<i>Clematis</i> , Linn. ..	1
<i>Cheiranthus Cheiri</i> , Linn. ..	1064	<i>afoliata</i> , Buch. ..	5
CHENOPODIACEÆ 577, 1085, 1147		<i>aphylla</i> , Col. ..	5
<i>Chenopodium</i> , Linn. ..	579, 1085	<i>australis</i> , T. Kirk ..	3
<i>album</i> , Linn. ..	1085	<i>Colensoi</i> , Hook. f. ..	3
<i>ambiguum</i> , R. Br. ..	581	<i>foetida</i> , Raoul ..	4
<i>ambrosioides</i> , Linn. ..	581	<i>Forsteri</i> , Gmel. ..	3
<i>Bonus-Henricus</i> , Linn. ..	1085	<i>hexapetala</i> , Forst. ..	3
<i>Botrys</i> , A. Cunn. ..	582	<i>hexasepala</i> , D.C. ..	3
<i>Buchanani</i> , T. Kirk ..	584	<i>hexasepala</i> , Hook. f. ..	3
<i>carinatum</i> , R. Br. ..	582	<i>Hilli</i> , Col. ..	1133
<i>detestans</i> , T. Kirk ..	579	<i>indivisa</i> , Willd. ..	2
<i>ficifolium</i> , Smith ..	1085	<i>integrifolia</i> , Forst. ..	2
<i>glaucum</i> , Linn. ..	580	<i>marata</i> , Armstr. ..	5
<i>maritimum</i> , Linn. ..	586	<i>Parkinsoniana</i> , Col. ..	4
<i>murale</i> , Linn. ..	1085	<i>parviflora</i> , A. Cunn. ..	4, 1133
<i>pumilio</i> , Hook. f. ..	582	<i>quadribracteolata</i> , Col. ..	6
<i>pusillum</i> , Hook. f. ..	582	<i>Clianthus</i> , Banks & Sol. ..	120
<i>triandrum</i> , Forst. ..	580	<i>maximus</i> , Col. ..	121
<i>urbicum</i> , Linn. ..	581	<i>puniceus</i> , Banks & Sol. ..	120, 1136
<i>vulvaria</i> , Linn. ..	580	<i>Cnicus arvensis</i> , Hoffm. ..	1078
<i>Chiloglottis</i> , R. Br. ..	689	<i>eriophorus</i> , Roth ..	1078
<i>cornuta</i> , Hook. f. ..	690	<i>lanceolatus</i> , Willd. ..	1078
<i>formicifera</i> , Fitzg. ..	690	<i>Coccoloba australis</i> , Forst. ..	592
<i>Traversii</i> , F. Muell. ..	689	<i>Cochlearia Armoracia</i> , Linn. ..	1064
CHLORANTHACEÆ ..	597	<i>Cænopteris flaccida</i> , Thunb. ..	995
<i>Chrysanthemum leucanthemum</i> , Linn. ..	1077	<i>novæ-zealandiæ</i> , Spreng. ..	995
<i>parthenium</i> , Bernh. ..	1077	<i>Colensoa</i> , Hook. f. ..	396
<i>segetum</i> , Linn. ..	1077	<i>physaloides</i> , Hook. f. ..	397
<i>Chrysobactron Hookeri</i> , Col. ..	718	<i>Collomia coccinea</i> , Lehm. ..	1080
<i>Rossii</i> , Hook. f. ..	718	<i>Colobanthus</i> , Bartl. ..	65
<i>Cichorium Intybus</i> , Linn. ..	1078	<i>acicularis</i> , Hook. f. ..	69
<i>Cineraria repanda</i> Forst. ..	367	<i>Benthamianus</i> , Fenzl. ..	68
<i>rotundifolia</i> , Forst. ..	383	<i>Billardieri</i> , Fenzl. ..	67
<i>Cinna ovata</i> , Kunth ..	859	<i>brevisepalus</i> , T. Kirk ..	68, 1134
<i>Citharexylum perforatum</i> , Forst. ..	564	<i>Buchanani</i> , T. Kirk ..	69
<i>Citrullus vulgaris</i> , Schrad. ..	1074	<i>cæspitosus</i> , Col. ..	66
		<i>canaliculatus</i> , T. Kirk ..	69
		<i>Muelleri</i> , T. Kirk ..	67

	Page		Page
<i>Colobanthus—continued.</i>		<i>Coprosma—continued.</i>	
<i>muscoides</i> , Hook. f.	66	<i>lentissima</i> , Col.	256
<i>quitensis</i> , Barth.	66	<i>linariifolia</i> , Hook. f.	259
<i>repens</i> , Col.	66	<i>lucida</i> , Forst.	246
<i>squarrosus</i> , Cheesem.	69	<i>lucida</i> , Endl.	247
<i>subulatus</i> , Hook. f.	68	<i>macrocarpa</i> , Cheesem.	246
<i>Colocasia antiquorum</i> , Schott.	1038	<i>margarita</i> , Col.	262
<i>Columnnea scabrosa</i> , Soland.	562	<i>microcarpa</i> , Hook. f.	262
COMPOSITÆ	267, 1076, 1141	<i>multiflora</i> , Col.	252
CONIFERÆ	644	<i>myrtillofolia</i> , Hook. f.	254, 260
<i>Conium maculatum</i> , Linn.	1074	<i>obconica</i> , T. Kirk	256
CONVOLVULACEÆ	473, 1081	<i>orbiculata</i> , Col.	253
<i>Convolvulus</i> , Linn.	477, 1081	<i>parviflora</i> , Hook. f.	253
<i>arvensis</i> , Linn.	1081	<i>pendula</i> , Col.	255
<i>chrysorrhizus</i> , Forst.	474	<i>perpusilla</i> , Col.	263
<i>erubescens</i> , Sims	477	<i>petiolata</i> , Hook. f.	248
<i>marginatus</i> , Spreng.	477	<i>Petriei</i> , Cheesem.	263
<i>sepium</i> , Linn.	475	<i>propinqua</i> , A. Cunn.	258
<i>Soldanella</i> , Linn.	476	<i>pubens</i> , Petrie	254
<i>truncatella</i> , Col.	476	<i>pumila</i> , Hook. f.	263
<i>tuguriorum</i> , Forst.	476	<i>pusilla</i> , Forst.	260
<i>Cookia Gnidia</i> , Gmel.	609	<i>ramulosa</i> , Petrie	254
<i>prostrata</i> , Gmel.	612	<i>repens</i> , Hook. f.	262
<i>Coprosma</i> , Forst.	242	<i>repens</i> , A. Rich.	260
<i>acerosa</i> , A. Cunn.	257, 1141	<i>retusa</i> , Petrie	261
<i>acutifolia</i> , Hook. f.	249	<i>retusa</i> , Hook. f.	247
<i>affinis</i> , Hook. f.	260	<i>rhamnoides</i> , A. Cunn.	252
<i>alba</i> , Col.	258	<i>rigida</i> , Cheesem.	255
<i>arboorea</i> , T. Kirk	250	<i>robusta</i> , Raoul	248
<i>arcuata</i> , Col.	1141	<i>rotundifolia</i> , A. Cunn.	251
<i>areolata</i> , Cheesem.	252, 1141	<i>rubra</i> , Petrie	256
<i>aurantiaca</i> , Col.	256	<i>rufescens</i> , Col.	251
<i>autumnalis</i> , Col.	246	<i>rugosa</i> , Cheesem.	1141
<i>Banksii</i> , Petrie	260	<i>sagittata</i> , Col.	260
<i>Baueri</i> , Endl.	247	<i>serrulata</i> , Hook. f.	247
<i>Baueriana</i> , Hook. f.	247	<i>Solandri</i> , T. Kirk	259
<i>Buchanani</i> , T. Kirk.	255	<i>spathulata</i> , A. Cunn.	251
<i>Chathamica</i> , Cockayne	248	<i>Stocki</i> , Barbier	247
<i>ciliata</i> , Hook. f.	253	<i>tenuicaulis</i> , Hook. f.	252
<i>coffæoides</i> , Col.	249	<i>tenuifolia</i> , Cheesem.	250, 1140
<i>Colensoi</i> , Hook. f.	260	<i>turbinata</i> , Col.	256
<i>concinna</i> , Col.	253	<i>virescens</i> , Petrie	257
<i>conferta</i> , A. Cunn.	1140	<i>Corallospartium</i> , Armstr.	108
<i>crassifolia</i> , Col.	255, 1141	<i>crassicaule</i> , Armstr.	108
<i>cuneata</i> , Hook. f.	261	<i>Cordylina</i> , Comm.	704
<i>Cunninghamii</i> , Hook. f.	249, 1140	<i>australis</i> , Hook. f.	706
<i>depressa</i> , Col.	262	<i>Banksii</i> , Hook. f.	706
<i>divaricata</i> , A. Cunn.	253	<i>Beuckelaerii</i> , L. Koch.	706
<i>divaricata</i> , Hook. f.	256	<i>calocoma</i> , Hort.	707
<i>foetidissima</i> , Forst.	259	<i>Cheesemani</i> , T. Kirk	705
<i>foetidissima</i> , A. Cunn.	249	<i>diffusa</i> , Col.	706
<i>gracilis</i> , A. Cunn.	253	<i>erythrorhachis</i> , Hort.	706
<i>grandifolia</i> , Hook. f.	246, 1140	<i>Forsteri</i> , F. Muell.	707
<i>heterophylla</i> , Col.	253	<i>Hectori</i> , Col.	707
<i>Kirkii</i> , Cheesem.	258	<i>Hooibrenkeana</i> , Goep.	1153
<i>lanceolata</i> , Col.	1140	<i>Hookeri</i> , T. Kirk	708
<i>latifolia</i> , Col.	1140	<i>indivisa</i> , Regel.	707

	Page		Page
Cordyline — <i>continued</i> .		Cotula — <i>continued</i> .	
<i>indivisa</i> , Steud.	707	<i>perpusilla</i> , Hook. f.	358
<i>lentiginosa</i> , Linden & Andre	707	<i>plumosa</i> , Hook. f.	352
<i>pumilio</i> , Hook. f.	708	<i>pulchella</i> , T. Kirk	359
<i>rubra</i> , Hueg.	1153	<i>pyrethrifolia</i> , Hook. f.	357
<i>stricta</i> , Hook. f.	708	<i>squalida</i> , Hook. f.	358
<i>Sturmii</i> , Col.	707	<i>Traillii</i> , T. Kirk	354
<i>superbiens</i> , L. Koch.	707	<i>venosa</i> , Col.	352
<i>terminalis</i> , Kunth.	705	Crantzia , Nutt.	207
<i>Veitchii</i> , Regel.	707	<i>lineata</i> , Nutt.	207
CORIARIEÆ	105	Craspedia , Forst.	347
Coriaria , Linn.	105	<i>alpina</i> , Backh.	348
<i>angustissima</i> , Hook. f.	106	<i>fimbriata</i> , D.C.	348
<i>arborea</i> , Lindsay	106	<i>Richea</i> , Cass.	348
<i>lurida</i> , T. Kirk	106	<i>uniflora</i> , Forst.	347
<i>ruscifolia</i> , Linn.	105	<i>viscosa</i> , Col.	348
<i>sarmentosa</i> , Forst.	106	CRASSULACEÆ	139, 1073, 1137
<i>thymifolia</i> , Humb. & Bonpl.	106	<i>Cratægus oxyacantha</i> , Linn.	1073
<i>Tutu</i> , Lindsay	106	<i>Crepidomanes reniforme</i> , Presl.	943
CORNACEÆ	236	Crepis , Linn.	386, 1079
Corokia , A. Cunn.	237	<i>fatida</i> , Linn.	1079
<i>buddleioides</i> , A. Cunn.	237	<i>novæ-zealandiæ</i> , Hook. f.	386
<i>Cotoneaster</i> , Raoul	238	<i>setosa</i> , Hall. f.	1079
<i>macrocarpa</i> , T. Kirk	237	<i>taraxacifolia</i> , Thuill.	1079
<i>Coronilla varia</i> , Linn.	1071	<i>virens</i> , Linn.	1079
Coryncarpus , Forst.	104, 1135	<i>Crocus sativus</i> , Linn.	698
<i>lævigata</i> , Forst.	104, 1135	CRUCIFERÆ	30, 1063, 1134
Corysanthes , R. Br.	692	<i>Cryptostemma calendulaceum</i> , R. Br.	1078
<i>bicalcarata</i> , R. Br.	693	CUCURBITACEÆ	189, 1074
<i>Cheesemanii</i> , Hook. f.	693	CUPULIFERÆ	639
<i>hypogæa</i> , Col.	695	Cuscuta , Linn.	479
<i>macrantha</i> , Hook. f.	696	<i>densiflora</i> , Hook. f.	479
<i>Matthewsii</i> , Cheesem.	693	<i>Epilinum</i> , Weihe	1081
<i>oblonga</i> , Hook. f.	694	<i>Epithymum</i> , Murr.	479, 1081
<i>orbiculata</i> , Col.	695	<i>Hassiacæ</i> , Pfeiff.	479, 1081
<i>papillosa</i> , Col.	696	<i>novæ-zealandiæ</i> , T. Kirk	480, 1081
<i>rivularis</i> , Hook. f.	694, 1152	<i>racemosa</i> , Mart.	479, 1081
<i>rotundifolia</i> , Hook. f.	695	Cussonia Lessonii , A. Rich.	234
<i>triloba</i> , Hook. f.	695	Cyathea , Smith	947
Cotula , Linn.	349	<i>Cunninghamii</i> , Hook. f.	950
<i>atrata</i> , Hook. f.	352	<i>dealbata</i> , Swartz	948
<i>australis</i> , Hook. f.	351, 1142	<i>medullaris</i> , Swartz	948
<i>coronopifolia</i> , Linn.	351	<i>Milnei</i> , Hook.	949
<i>dioica</i> , Hook. f.	358, 1142	<i>polyneuron</i> , Col.	949
<i>Featherstonii</i> , F. Muell.	356	<i>Smithii</i> , Hook. f.	951
<i>filiformis</i> , Hook. f.	355	<i>stellulata</i> , Col.	951
<i>Goyeni</i> , Petrie	356	<i>tricolor</i> , Col.	948
<i>Haastii</i> , T. Kirk	355	Cyathodes , Labill.	410
<i>integrifolia</i> , Hook. f.	351	<i>acerosa</i> , R. Br.	411
<i>lanata</i> , Hook. f.	353	<i>articulata</i> , Col.	411
<i>linearifolia</i> , Cheesem.	357	<i>Colensoi</i> , Hook. f.	412
<i>Maniototo</i> , Petrie	354	<i>empetrifolia</i> , Hook. f.	412
<i>minor</i> , Hook. f.	354	<i>oxycedrus</i> , R. Br.	411
<i>minuta</i> , Forst.	360	<i>pumila</i> , Hook. f.	413
<i>Muelleri</i> , T. Kirk	353	<i>robusta</i> , Hook. f.	411
<i>obscura</i> , T. Kirk	359	Cymbidium autumnale , Swartz	666
<i>pectinata</i> , Hook. f.	356		

	Page		Page
<i>Cynara Cardunculus</i> , Linn. . .	1078	<i>Danthonia</i> —continued.	
<i>Cynodon Dactylon</i> , Pers. . .	1091	<i>nervosa</i> , Col. . .	890
<i>Cynoglossum nobile</i> , Hook. f. . .	1146	<i>nuda</i> , Hook. f. . .	892
<i>Cynosurus cristatus</i> , Linn. . .	1091	<i>oreophila</i> , Petrie . .	888, 1155
<i>echinatus</i> , Linn. . .	1091	<i>ovata</i> , Buch. . .	885
CYPERACEÆ . .	762, 1089, 1154	<i>pallida</i> , A. Cunn. . .	880
<i>Cyperus</i> , Linn. . .	765, 1089	<i>pallida</i> , Petrie . .	889
<i>Buchanani</i> , T. Kirk . .	766	<i>pauciflora</i> , Buch. . .	895
<i>gracilis</i> , Buch. . .	766	<i>pentaflora</i> , Col. . .	885
<i>lucidus</i> , R. Br. . .	1089	<i>pilosa</i> , R. Br. . .	890
<i>rotundus</i> , Linn. . .	1089	<i>planifolia</i> , Petrie . .	889
<i>tenellus</i> , Linn. f. . .	765	<i>pungens</i> , Cheesem. . .	887
<i>ustulatus</i> , A. Rich. . .	766	<i>Raoulii</i> , Steud. . .	886
<i>vegetus</i> , Willd. . .	766	<i>rigida</i> , Hook. f. . .	885
<i>Cyrtostylis</i> , R. Br. . .	685	<i>rigida</i> , Raoul . .	886
<i>macrophylla</i> , Hook. f. . .	685	<i>semiannularis</i> , R. Br. . .	891
<i>oblonga</i> , Hook. f. . .	685	<i>Thomsoni</i> , Buch. . .	892
<i>rotundifolia</i> , Hook. f. . .	685	<i>unarede</i> , Raoul . .	891
<i>Cystopteris</i> , Bernh. . .	957	<i>Darea flaccida</i> , Willd. . .	995
<i>fragilis</i> , Bernh. . .	957	<i>Datura Stramonium</i> , Linn. . .	1082
<i>laciniatus</i> , Col. . .	957	<i>Daucus</i> , Linn. . .	225, 1075
<i>novæ-zealandiæ</i> , Armstr. . .	957	<i>brachiatus</i> , Sieb. . .	225
<i>tasmanica</i> , Hook. . .	957	<i>Carota</i> , Linn. . .	225, 1075
<i>Cytisus albus</i> , Link. . .	1070	<i>Davallia</i> , Smith . .	955
<i>candicans</i> , Lam. . .	1070	<i>canariensis</i> , Linn. . .	956
<i>scoparius</i> , Link. . .	1070	<i>dealbata</i> , A. Cunn. . .	947
<i>Dacrydium</i> , Soland. . .	651	<i>Forsteri</i> , Carruthers . .	956
<i>Bidwillii</i> , Hook. f. . .	653	<i>hispida</i> , Heward . .	956
<i>biforme</i> , Pilger . .	653	<i>novæ-zealandiæ</i> , Col. . .	956
<i>Colensoi</i> , Hook. . .	655	<i>Tasmani</i> , Cheesem. . .	955
<i>Colensoi</i> , Hook. f. . .	653	<i>Dendrobium</i> , Swartz . .	663
<i>cupressinum</i> , Soland. . .	654	<i>biflorum</i> , A. Rich. . .	663
<i>excelsum</i> , D. Don. . .	651	<i>Cunninghamii</i> , Lindl. . .	663
<i>ferrugineum</i> , Van Houtte . .	651	<i>Lessonii</i> , Col. . .	663
<i>Kirkii</i> , F. Muell. . .	652	<i>pygmæum</i> , Smith . .	665
<i>intermedium</i> , T. Kirk . .	655	<i>Deschampsia</i> , Beauv. . .	874
<i>laxifolium</i> , Hook. f. . .	657	<i>cæspitosa</i> , Beauv. . .	875
<i>Mai</i> , A. Cunn. . .	651	<i>Chapmani</i> , Petrie . .	877
<i>plumosum</i> , D. Don. . .	646	<i>flexuosa</i> , Trin. . .	1090
<i>taxifolium</i> , Banks & Sol. . .	651	<i>gracillima</i> , T. Kirk . .	878
<i>thuyoides</i> , Banks & Sol. . .	651	<i>Hookeri</i> , T. Kirk . .	877, 878
<i>Westlandicum</i> , T. Kirk . .	656	<i>novæ-zealandiæ</i> , Petrie . .	876
<i>Dactylanthus</i> , Hook. f. . .	625	<i>penicillata</i> , T. Kirk . .	879
<i>Taylori</i> , Hook. f. . .	626	<i>pusilla</i> , Petrie . .	876
<i>Dactylis cæspitosa</i> , Forst. . .	901	<i>tenella</i> , Petrie . .	878
<i>glomerata</i> , Linn. . .	1091	<i>Desmoschænus spiralis</i> , Hook. f. . .	777
<i>Dammara australis</i> , Lamb. . .	645	<i>Deyeuxia</i> , Clarion . .	867
<i>Danthonia</i> , D.C. . .	883	<i>avenoides</i> , Buch. . .	871
<i>antarctica</i> , Hook. f. . .	885, 886	<i>Billardieri</i> , Kunth . .	869
<i>australis</i> , Buch. . .	888	<i>Forsteri</i> , Kunth . .	868
<i>bromoides</i> , Hook. f. . .	885	<i>Petriei</i> , Hack. . .	872
<i>Buchanani</i> , Hook. f. . .	891	<i>pilosa</i> , Buch. . .	868
<i>crassiuscula</i> , T. Kirk . .	887	<i>quadriseta</i> , Benth. . .	872
<i>Cunninghamii</i> , Hook. f. . .	884	<i>scabra</i> , Buch. . .	873
<i>flavescens</i> , Hook. f. . .	886	<i>setifolia</i> , Hook. f. . .	870
<i>gracilis</i> , Hook. f. . .	891	<i>Youngii</i> , Buch. . .	871

	Page		Page
<i>Dianella, Lam.</i> ..	714	<i>Doodia—continued.</i>	
<i>intermedia, Endl.</i> ..	715	<i>Kunthiana, Gaud.</i> ..	985
<i>nigra, Col.</i> ..	715	<i>media, R. Br.</i> ..	985
<i>reflexa, Col.</i> ..	715	<i>Milnei, Carruthers</i> ..	985
<i>Dianthus Armeria, Linn.</i> ..	1066	<i>squarrosa, Col.</i> ..	986
<i>barbatus, Linn.</i> ..	1066	<i>Dracaena australis, Forst.</i> ..	707
<i>prolifer, Linn.</i> ..	1066	<i>indivisa, Forst.</i> ..	708
<i>Dicera dentata, Forst.</i> ..	85	<i>Dracænopsis australis, Planch.</i> ..	707
<i>serrata, Forst.</i> ..	85	<i>Dracophyllum, Labill.</i> ..	418
<i>Dichelachne, Endl.</i> ..	873	<i>acerosum, Berggr.</i> ..	427
<i>crinita, Hook. f.</i> ..	873	<i>affine, Hook. f.</i> ..	421
<i>Forsteriana, Trin. & Rupr.</i> ..	874	<i>angustifolium, Col.</i> ..	1143
<i>Hookeriana, Trin. & Rupr.</i> ..	874	<i>arboresum, Cockayne</i> ..	425
<i>montana, Endl.</i> ..	874	<i>brachycladum, Col.</i> ..	422
<i>sciurea, Hook. f.</i> ..	874, 1155	<i>brachyphyllum, Col.</i> ..	422
<i>Sieberiana, Trin. & Rupr.</i> ..	874	<i>Featonianum, Col.</i> ..	1143
<i>stipoides, Hook. f.</i> ..	858	<i>filifolium, Hook. f.</i> ..	424
<i>Dichondra, Forst.</i> ..	478	<i>heterophyllum, Col.</i> ..	424
<i>brevifolia, Buch.</i> ..	478	<i>imbricatum, Col.</i> ..	421
<i>repens, Forst.</i> ..	478	<i>Kirkii, Berggr.</i> ..	426
<i>Dicksonia, L'Herit.</i> ..	952	<i>latifolium, A. Cunn.</i> ..	419
<i>antarctica, Hook. f.</i> ..	954	<i>Lessonianum, A. Rich.</i> ..	424
<i>antarctica, Labill.</i> ..	954	<i>longifolium, R. Br.</i> ..	422
<i>fibrosa, Col.</i> ..	953	<i>Lyallii, Hook. f.</i> ..	423
<i>gracilis, Col.</i> ..	953	<i>Menziesii, Hook. f.</i> ..	420
<i>intermedia, Col.</i> ..	954	<i>minimum, Hook. f.</i> ..	428
<i>lanata, Col.</i> ..	954	<i>muscoides, Hook. f.</i> ..	428
<i>lævis, Heward</i> ..	954	<i>paludosum, Cockayne</i> ..	425
<i>microcarpa, Col.</i> ..	954	<i>Pearsoni, T. Kirk</i> ..	424
<i>Sparrmanniana, Col.</i> ..	954	<i>prostratum, T. Kirk</i> ..	428
<i>squarrosa, Swartz</i> ..	953	<i>pubescens, Cheesem.</i> ..	426
<i>Dictynnia lanceolata, J. Smith</i> ..	1012	<i>pungens, Col.</i> ..	424
<i>Dictyopteris lanceolata, J. Smith</i> ..	1012	<i>recurvatum, Col.</i> ..	419
<i>Digitalis purpurea, Linn.</i> ..	1082	<i>recurvum, Hook. f.</i> ..	422, 1143
<i>Dionæa muscipula, Ellis</i> ..	144	<i>rosmarinifolium, Buch.</i> ..	425
<i>Diplazium congruum, Brack.</i> ..	996	<i>rosmarinifolium, R. Br.</i> ..	427
<i>Diplaz avenacea, Raoul</i> ..	853	<i>rubrum, Col.</i> ..	422
<i>polynoda, Hook. f.</i> ..	854	<i>scoparium, Hook. f.</i> ..	424
<i>Diplotaxis muralis, D.C.</i> ..	1065	<i>setifolium, Stecheg.</i> ..	424
DIPSACEÆ ..	1075	<i>Sinclairii, Cheesem.</i> ..	421
<i>Dipsacus sylvestris, Mill.</i> ..	1075	<i>squarrosus, Hook. f.</i> ..	422
<i>Discaria, Hook.</i> ..	101	<i>strictum, Hook. f.</i> ..	421, 1143
<i>australis, Hook.</i> ..	101	<i>subulatum, Hook. f.</i> ..	425, 1143
<i>Toumatou, Raoul</i> ..	101	<i>tenuicaulis, Col.</i> ..	422
<i>Ditoca muscosa, Banks</i> ..	576	<i>Townsoni, Cheesem.</i> ..	420
<i>Diuris novæ-zealandiæ, A. Rich.</i> ..	673	<i>Traversii, Hook. f.</i> ..	420
<i>Dodonæa, Linn.</i> ..	102	<i>uniflorum, Hook. f.</i> ..	427
<i>spathulata, Smith</i> ..	103	<i>uniflorum, Berggren</i> ..	426
<i>viscosa, Jacq.</i> ..	102	<i>Urvilleanum, A. Rich.</i> ..	423
<i>Donatia, Forst.</i> ..	134	<i>varium, Col.</i> ..	422
<i>novæ-zealandiæ, Hook. f.</i> ..	134	<i>virgatum, Col.</i> ..	424
<i>Donia punicea, G. Don</i> ..	121	<i>Drapetes, Banks</i> ..	615
<i>Doodia, R. Br.</i> ..	985	<i>Dieffenbachii, Hook.</i> ..	615
<i>aspera, A. Rich.</i> ..	985	<i>Lyallii, Hook. f.</i> ..	616
<i>caudata, R. Br.</i> ..	986	<i>macrantha, Col.</i> ..	616
<i>connexa, Hook. f.</i> ..	985	<i>muscosa, Hook. f.</i> ..	617
		<i>tasmanica, Hook. f.</i> ..	615
		<i>villosa, Cheesem.</i> ..	616, 1147

	Page		Page
<i>Drimys</i> , Forst.	29	<i>Eleocharis</i> —continued.	
<i>axillaris</i> , Forst.	29	<i>ambigua</i> , T. Kirk	769
<i>colorata</i> , Raoul	30	<i>Cunninghamii</i> , Boeck.	769
<i>Traversii</i> , T. Kirk	30	<i>gracilis</i> , Hook. f.	769
<i>Drosera</i> , Linn.	144	<i>gracillima</i> , Hook. f.	769
<i>Arcturi</i> , Hook.	145	<i>Hookeri</i> , Boeck.	769
<i>atra</i> , Col.	145	<i>neo-zealandica</i> , C. B. Clarke	768
<i>auriculata</i> , Backh.	146	<i>plantaginea</i> , R. Br.	768
<i>binata</i> , Labill.	146	<i>sphacelata</i> , R. Br.	767
<i>circinnervia</i> , Col.	147	<i>Eleusine</i> , Gaertn.	892
<i>flagellifera</i> , Col.	146	<i>indica</i> , Gaertn.	892
<i>intermedia</i> , R. Cunn.	146	<i>Elodea canadensis</i> , Michx.	1087
<i>ligulata</i> , Col.	145	<i>Elynanthus capillaceus</i> , Benth.	789
<i>minutula</i> , Col.	146	<i>Elytranthe</i> , Blume	1148
<i>polyneura</i> , Col.	145	<i>Adamsii</i> , Engl.	1149
<i>propinqua</i> , R. Cunn.	146	<i>Colensoi</i> , Engl.	1148
<i>pygmæa</i> , D.C.	145	<i>decussata</i> , Engl.	1149
<i>ruahinensis</i> , Col.	145	<i>flavida</i> , Engl.	1149
<i>spatulata</i> , Labill.	146	<i>Haastii</i> , Engl.	1149
<i>stenopetala</i> , Hook. f.	145	<i>punctata</i> , Engl.	1148
<i>stylosa</i> , Col.	147	<i>tetrapetala</i> , Engl.	1148
<i>triflora</i> , Col.	146	<i>uniflora</i> , Engl.	1149
<i>DROSERACEÆ</i>	144	<i>Emex australis</i> , Steinh.	1086
<i>Dysoxylum</i> , Blume	95	<i>Enargea</i> , Banks & Sol.	704
<i>spectabile</i> , Blume	95	<i>marginata</i> , Banks & Sol.	704
<i>Earina</i> , Lindl.	665	<i>Entelea</i> , R. Br.	82
<i>alba</i> , Col.	666	<i>arborescens</i> , R. Br.	82
<i>autumnalis</i> , Hook. f.	666	<i>Entogonum lævigatum</i> , Gaertn.	94
<i>mucronata</i> , Lindl.	665	<i>EPACRIDÆ</i>	409, 1079, 1143
<i>quadrilobata</i> , Col.	666	<i>Epacris</i> , Forst.	415, 1079
<i>suaveolens</i> , Lindl.	666	<i>affinis</i> , Col.	416
<i>Echinopogon</i> , Beauv.	858	<i>alpina</i> , Hook. f.	416
<i>ovatus</i> , Beauv.	859	<i>fasciculata</i> , Forst.	414
<i>Echium plantagineum</i> , Linn.	1081	<i>juniperina</i> , Forst.	411
<i>vulgare</i> , Linn.	1081	<i>longifolia</i> , Forst.	423
<i>Edwardsia grandiflora</i> , Salisb.	123	<i>microphylla</i> , R. Br.	416, 1080
<i>Macnabiana</i> , R. Grah.	123	<i>pauciflora</i> , A. Rich.	415
<i>microphylla</i> , Salisb.	123	<i>pulchella</i> , Cav.	416, 1080
<i>Ehrharta</i> , Thunb.	851	<i>pumila</i> , Forst.	410
<i>Colensoi</i> , Hook. f.	851	<i>purpurascens</i> , R. Br.	1079
<i>Thomsoni</i> , Petrie	852	<i>racemosa</i> , Hook. f.	417
<i>Elæocarpus</i> , Linn.	84	<i>rosmarinifolia</i> , Forst.	427
<i>Cunninghamii</i> , Raoul	85	<i>Sinclairii</i> , Hook. f.	415
<i>dentatus</i> , Vahl.	85	<i>Epiblema grandiflorum</i> , R. Br.	671
<i>Hinau</i> , A. Cunn.	85	<i>Epicarpurus microphyllus</i> , Raoul	632
<i>Hookerianus</i> , Raoul	85	<i>Epidendrum autumnale</i> , Forst.	666
<i>Elæodendron micranthum</i> , Hook. f.	47	<i>Epilobium</i> , Linn.	171
<i>Elatine</i> , Linn.	73	<i>alsinoides</i> , A. Cunn.	177
<i>americana</i> , Arn.	73	<i>Billardieranum</i> , Ser.	174
<i>gratioloides</i> , A. Cunn.	73	<i>brevipes</i> , Hook. f.	182
<i>ELATINÆ</i>	73	<i>cæspitosum</i> , Haussk.	180
<i>Elatostemma</i> , Forst.	636	<i>chionanthum</i> , Haussk.	173
<i>rugosum</i> , A. Cunn.	636	<i>chlorefolium</i> , Haussk.	178
<i>Eleocharis</i> , R. Br.	767	<i>cinereum</i> , A. Rich.	175
<i>acicularis</i> , R. Br.	768	<i>confertifolium</i> , Hook. f.	175, 1137
<i>acuta</i> , R. Br.	768	<i>confertum</i> , A. Cunn.	175
		<i>crassum</i> , Hook. f.	181

	Page		Page
Epilobium—continued.		Erigeron—continued.	
<i>elegans</i> , Petrie ..	185	<i>linifolius</i> , Willd. ..	1076
<i>erectum</i> , Petrie ..	175	<i>novæ-zealandiæ</i> , Buch. ..	304
<i>erubescens</i> , Haussk. ..	185	<i>Eriostemon dentatus</i> , Colla. ..	85
<i>glabellum</i> , Forst. ..	185	<i>Erodium cicutarium</i> , L'Herit. ..	1069
<i>gracilipes</i> , T. Kirk ..	181	<i>malachoides</i> , Willd. ..	1069
<i>haloragifolium</i> , A. Cunn. ..	176	<i>moschatum</i> , L'Herit. ..	1069
<i>haloragifolium</i> , T. Kirk ..	176	<i>Erophila vulgaris</i> , D.C. ..	1064
<i>Hectori</i> , Haussk. ..	177	<i>Erpetion spathulatum</i> , A. Cunn. ..	45
<i>hirtigerum</i> , A. Cunn. ..	175	<i>Eruca sativa</i> , Mill. ..	1065
<i>incanum</i> , A. Cunn. ..	175	<i>Eryngium</i> , Linn. ..	203
<i>insulare</i> , Haussk. ..	178	<i>vesiculosum</i> , Labill. ..	203, 1038
<i>junceum</i> , Soland. ..	174	<i>Erythraea centaurium</i> , Pers. ..	1080
<i>Krulleanum</i> , Haussk. ..	184	<i>Eschscholtzia californica</i> , Cham. ..	1064
<i>linnæoides</i> , Hook. f. ..	179	<i>Eucalyptus globulus</i> , Labill. ..	1073
<i>macranthum</i> , Hook. ..	173	<i>Eugenia</i> , Linn. ..	170
<i>macropus</i> , Hook. ..	180	<i>Maire</i> , A. Cunn. ..	170
<i>melanocaulon</i> , Hook. ..	183	<i>obcordata</i> , Raoul ..	169
<i>microphyllum</i> , A. Rich. ..	184	<i>vitis-ideæ</i> , Raoul ..	169
<i>nanum</i> , Col. ..	177	<i>Euphrasia</i> , Linn. ..	552
<i>nerterioides</i> , A. Cunn. ..	180	<i>antarctica</i> , Hook. f. ..	555
<i>novæ-zealandiæ</i> , Haussk. ..	185	<i>Berggreni</i> , Wettst. ..	555
<i>nummularifolium</i> , R. Cunn. ..	179	<i>Cheesemani</i> , Wettst. ..	556
<i>pallidiflorum</i> , Soland. ..	173	<i>Cockayniana</i> , Petrie ..	555
<i>pedunculare</i> , A. Cunn. ..	180	<i>cuneata</i> , Forst. ..	553, 1146
<i>perplexum</i> , T. Kirk ..	178	<i>disperma</i> , Hook. f. ..	557
<i>pictum</i> , Petrie ..	176, 1137	<i>Dyeri</i> , Wettst. ..	556
<i>polyclonum</i> , Haussk. ..	183	<i>longiflora</i> , T. Kirk ..	557
<i>pubens</i> , A. Rich. ..	175	<i>Monroi</i> , Hook. f. ..	554
<i>purpuratum</i> , Hook. f. ..	180	<i>pygmæa</i> , Col. ..	555
<i>pyncostachyum</i> , Haussk. ..	182	<i>repens</i> , Hook. f. ..	556
<i>rotundifolium</i> , Forst. ..	179	<i>revoluta</i> , Hook. f. ..	554
<i>rostratum</i> , Cheesem. ..	183	<i>tricolor</i> , Col. ..	553
<i>tasmanicum</i> , Haussk. ..	176	<i>zealandica</i> , Wettst. ..	555
<i>tasuipes</i> , Hook. f. ..	177	Euphorbia , Linn. ..	627, 1086
<i>tetragonum</i> , Hook. f. ..	174	<i>glaucæ</i> , Forst. ..	628
<i>thymifolium</i> , R. Cunn. ..	178	<i>helioscopia</i> , Linn. ..	1086
<i>vernicosum</i> , Cheesem. ..	182, 1137	<i>hypericifolia</i> , Linn. ..	1087
<i>virgatum</i> , A. Cunn. ..	175	<i>Lathyrus</i> , Linn. ..	1087
Epipactis porrifolia , Swz. ..	673	<i>ovalifolia</i> , Engelm. ..	1087
Eragrostis Brownii , Nees ..	1091	<i>Peplus</i> , Linn. ..	1086
<i>imbecilla</i> , Benth. ..	913	EUPHORBACEÆ ..	626, 1086
<i>major</i> , Host. ..	1091	<i>Eurybia albidæ</i> , Hook. f. ..	291
<i>minor</i> , Host. ..	1091	<i>alpina</i> , Lindl. & Paxt. ..	285
<i>megastachya</i> , Link. ..	1091	<i>avicenniæfolia</i> , Hook. f. ..	291
Erechtites , Raf. ..	363	<i>Colensoi</i> , F. Muell. ..	1141
<i>arguta</i> , D.C. ..	364	<i>Cunninghamii</i> , Hook. f. ..	287
<i>diversifolia</i> , Petrie ..	366	<i>dentata</i> , Hook. f. ..	286
<i>glabrescens</i> , T. Kirk ..	366	<i>Forsteri</i> , Hook. f. ..	292
<i>hispidula</i> , Hook. f. ..	365	<i>furfuracea</i> , D.C. ..	284
<i>prenanthoides</i> , D.C. ..	364	<i>Lyallii</i> , Hook. f. ..	283
<i>pumila</i> , Armstr. ..	365	<i>nitida</i> , Hook. f. ..	285
<i>quadridentata</i> , D.C. ..	365	<i>nummularifolia</i> , Hook. f. ..	290
<i>scaberula</i> , Hook. f. ..	365	<i>operina</i> , F. Muell. ..	1141
ERICACEÆ ..	404	<i>semidentata</i> , F. Muell. ..	280
Erigeron Bonplandii , Buch. ..	305	<i>Solandri</i> , Hook. f. ..	294
<i>canadensis</i> , Linn. ..	1076	<i>Traversii</i> , F. Muell. ..	284
		<i>virgata</i> , Hook. f. ..	294

	Page		Page
<i>Eurybiopsis australis</i> , Hook. f. ..	319	<i>Friesia racemosa</i> , A. Cunn ..	83
<i>Exarrhena Colensoi</i> , T. Kirk ..	462, 469	<i>Fuchsia</i> , Linn. ..	186
<i>Lycallii</i> , Hook. f. ..	470	<i>Colensoi</i> , Hook. f. ..	187
<i>macrantha</i> , Hook. f. ..	471	<i>excorticata</i> , Linn. f. ..	186
<i>petiolata</i> , Hook. f. ..	467	<i>Kirkii</i> , Hook. f. ..	187
<i>saxosa</i> , Hook. f. ..	469	<i>procumbens</i> , Hook. f. ..	187
<i>Exocarpus</i> , Labill. ..	624	<i>Fuirena rubiginosa</i> , Spreng. ..	786
<i>Bidwillii</i> , Hook. f. ..	652	<i>Fumaria muralis</i> , Sond. ..	1064
		<i>officinalis</i> , Linn. ..	1064
<i>Fagopyrum esculentum</i> , Moench ..	1086	<i>Fusanus</i> , R. Br. ..	623
<i>Fagus</i> , Linn. ..	640	<i>Cunninghamii</i> , Benth. & Hook. f. ..	624
<i>apiculata</i> , Col. ..	642		
<i>Blairii</i> , T. Kirk ..	642	<i>Gahnia</i> , Forst. ..	791
<i>cliffortioides</i> , Hook. f. ..	643	<i>affinis</i> , Steud. ..	795
<i>fusca</i> , Hook. f. ..	641	<i>arenaria</i> , Hook. f. ..	795
<i>Menziesii</i> , Hook. f. ..	640	<i>articulata</i> , F. Muell. ..	786
<i>Solandri</i> , Hook. f. ..	643	<i>ebenocarpa</i> , Hook. f. ..	793
<i>truncata</i> , Col. ..	641	<i>exigua</i> , Col. ..	792
<i>Ferraria izioides</i> , Willd. ..	699	<i>Gaudichaudi</i> , Steud. ..	795
<i>Festuca</i> , Linn. ..	916	<i>Hectori</i> , T. Kirk ..	793
<i>bromoides</i> , Linn. ..	1092	<i>lacera</i> , Steud. ..	795
<i>contracta</i> , T. Kirk ..	919	<i>multiglumis</i> , Col. ..	792
<i>Coxii</i> , Hack. ..	919	<i>parviflora</i> , Col. ..	792
<i>duriuscula</i> , Hook. f. ..	917, 918	<i>pauciflora</i> , T. Kirk ..	793
<i>elatior</i> , Linn. ..	1092	<i>procera</i> , Forst. ..	794
<i>foliosa</i> , Hook. f. ..	901	<i>rigida</i> , T. Kirk ..	792
<i>littoralis</i> , Labill. ..	917	<i>robusta</i> , T. Kirk ..	794
<i>myurus</i> , Linn. ..	1092	<i>setifolia</i> , Hook. f. ..	792, 1154
<i>ovina</i> , Linn. ..	917, 1092	<i>scaberula</i> , Col. ..	792
<i>pratensis</i> , Huds. ..	1092	<i>xanthocarpa</i> , Hook. f. ..	793
<i>rigida</i> , Kunth ..	1092	<i>Gaimardia</i> , Gaud. ..	758
<i>rubra</i> , Linn. ..	918, 1092	<i>ciliata</i> , Hook. f. ..	758
<i>scabra</i> , Labill. ..	923	<i>pallida</i> , Hook. f. ..	757
<i>scoparia</i> , Hook. f. ..	902, 1155	<i>setacea</i> , Hook. f. ..	758
FILICES ..	190, 1074	<i>Galega officinalis</i> , Linn. ..	1071
<i>Ficus carica</i> , Linn. ..	1087	<i>Galeopsis Tetrahit</i> , Linn. ..	1084
<i>elastica</i> , Roxb. ..	631	<i>Galinsoga parviflora</i> , Cav. ..	1076
<i>indica</i> , Linn. ..	631	<i>Galium</i> , Linn. ..	265, 1075
FILICES ..	925, 1157	<i>Aparine</i> , Linn. ..	266, 1075
<i>Fimbristylis</i> , Vahl. ..	769	<i>erythrocaulon</i> , Col. ..	266
<i>dichotoma</i> , Hook. f. ..	770	<i>Mollugo</i> , Linn. ..	1075
<i>squarrosa</i> , Vahl. ..	770	<i>palustre</i> , Linn. ..	1075
<i>velata</i> , R. Br. ..	770	<i>parisiense</i> , Linn. ..	1075
<i>Fœniculum vulgare</i> , Mill. ..	1074	<i>propinquum</i> , A. Cunn. ..	266
<i>Forstera</i> , Linn. f. ..	392	<i>tenuicaule</i> , A. Cunn. ..	266
<i>aretriastriifolia</i> , Homb. & Jacq. ..	390	<i>triloba</i> , Col. ..	266
<i>Bidwillii</i> , Hook. f. ..	393	<i>umbrosum</i> , Soland. ..	266
<i>clavigera</i> , Hook. f. ..	390	<i>Gastridium australe</i> , Beauv. ..	1090
<i>major</i> , Col. ..	393	<i>lendigerum</i> , Gaud. ..	1090
<i>sedifolia</i> , Linn. f. ..	392	<i>Gastrodia</i> , R. Br. ..	696
<i>tenella</i> , Hook. f. ..	393	<i>Cunninghamii</i> , Hook. f. ..	697
<i>truncatella</i> , Col. ..	393	<i>Hectori</i> , Buch. ..	697
<i>Fragaria elatior</i> , Ehr. ..	1072	<i>leucopetala</i> , Col. ..	697
<i>vesca</i> , Linn. ..	1072	<i>minor</i> , Petrie ..	697
<i>Freycinetia</i> , Gaud. ..	741	<i>sesamoides</i> , R. Br. ..	697
<i>Banksii</i> , A. Cunn. ..	441, 1153	<i>Gaultheria</i> , Kahn ..	404
<i>inclians</i> , Benn. ..	742	<i>antipoda</i> , Forst. ..	405

	Page		Page
<i>Gaultheria</i> —continued.		<i>Geranium</i> —continued.	
<i>calycina</i> , Col.	407	<i>Robertianum</i> , Linn.	1068
<i>Colensoi</i> , Hook. f.	407	<i>sessiliflorum</i> , Cav.	89
<i>depressa</i> , Hook. f.	405	<i>Traversii</i> , Hook. f.	89
<i>divergens</i> , Col.	407	GESNERACEÆ	562
<i>epiphyta</i> , Col.	405	<i>Geum</i> , Linn.	126
<i>fagifolia</i> , Hook. f.	407	<i>alpinum</i> , Buch.	127
<i>fluviatilis</i> , A. Cunn.	405	<i>aucklandicum</i> , Greene	1136
<i>glandulosa</i> , Col.	407	<i>leiospermum</i> , Petrie	128
<i>multibracteolata</i> , Col.	407	<i>magellanicum</i> , Comm.	127
<i>oppositifolia</i> , Hook. f.	407	<i>parviflorum</i> , Smith	127
<i>perplexa</i> , T. Kirk	406	<i>pusillum</i> , Petrie	129
<i>rupestris</i> , R. Br.	406	<i>sericeum</i> , T. Kirk	128, 1136
<i>subcorymbosa</i> , Col.	407	<i>uniflorum</i> , Buch.	128, 1136
<i>Gaya</i> , H.B.K.	79	<i>urbanum</i> , Linn.	127
<i>Lyallii</i> , J. E. Baker	80, 1135	<i>Gilia squarrosa</i> , Hook. & Arn.	1080
<i>Geniostoma</i> , Forst.	443	<i>Gingidium antipodum</i> , F. Muell.	1139
<i>ligustrifolium</i> , A. Cunn.	444	<i>Dieffenbachii</i> , F. Muell.	214
<i>rupestre</i> , A. Rich.	444	<i>montanum</i> , Forst.	223
<i>Gentiana</i> , Linn.	446	<i>Monroi</i> , F. Muell.	1139
<i>antarctica</i> , T. Kirk	455	<i>squarrosus</i> , F. Muell.	1138
<i>antipoda</i> , T. Kirk	456	<i>Traversii</i> , F. Muell.	210
<i>bellidifolia</i> , Hook. f.	452	<i>Githago segetum</i> , Desf.	1067
<i>Campbellii</i> , Homb. & Jacq.	454	<i>Glaucium flavum</i> , Crantz	1064
<i>cerina</i> , Hook. f.	454	<i>luteum</i> , Scop.	1064
<i>chathamica</i> , Cheesem.	449	<i>Gleichenia</i> , Smith	1017
<i>concinna</i> , Hook. f.	455	<i>alpina</i> , R. Br.	1019
<i>corymbifera</i> , T. Kirk	449	<i>ciliata</i> , Col.	1019
<i>divisa</i> , Cheesem.	453	<i>circinata</i> , Swz.	1017
<i>filipes</i> , Cheesem.	448	<i>Cunninghamii</i> , Heward	1019
<i>gracilifolia</i> , Cheesem.	1144	<i>dicarpa</i> , R. Br.	1018
<i>Grisebachii</i> , Hook. f.	448	<i>dichotoma</i> , Swz.	1020
<i>Hookeri</i> , Armstr.	454	<i>flabellata</i> , R. Br.	1020
<i>lineata</i> , T. Kirk	448	<i>heciostophylla</i> , A. Cunn.	1019
<i>montana</i> , Forst.	451, 1145	<i>Hermannii</i> , R. Br.	1020
<i>montana</i> , Hook. f.	448	<i>littoralis</i> , Col.	1020
<i>novæ-zealandiæ</i> , Armstr.	449	<i>microphylla</i> , R. Br.	1018
<i>patula</i> , Cheesem.	452	<i>patens</i> , Col.	1018
<i>pleurogynoides</i> , Hook. f.	450	<i>punctulata</i> , Col.	1018
<i>saxosa</i> , Forst.	454	<i>semivestita</i> , Labill.	1018
<i>Spenceri</i> , T. Kirk	453	<i>speluncæ</i> , R. Br.	1018
<i>Townsoni</i> , Cheesem.	450	<i>Glossogyne Henedyi</i> , R. Br. (ter)	1076
<i>vernica</i> , Cheesem.	1145	<i>Glossostigma</i> , Arn.	487
GENTIANEÆ	444, 1144	<i>elatinoides</i> , Benth.	488
<i>Geophila dichondraefolia</i> , A. Cunn.	265, 1080	<i>spathulatum</i> , Arn.	488
GERANIACEÆ	87, 1069	<i>submersum</i> , Petrie	488
<i>Geranium</i> , Linn.	88, 1069	<i>Glyceria aquatica</i> , Wahl.	1092
<i>brevicaule</i> , Hook.	89	<i>distans</i> , Wahl.	1092
<i>dissectum</i> , Linn.	88	<i>fluitans</i> , R. Br.	1092
<i>microphyllum</i> , Hook. f.	89	<i>novæ-zealandiæ</i> , Petrie	915
<i>molle</i> , Linn.	90	<i>stricta</i> , Hook. f.	915
<i>patagonicum</i> , Hook. f.	88	<i>Gnaphalium</i> , Linn.	322, 1076
<i>patulum</i> , Forst.	88	<i>adherens</i> , Col.	323
<i>pilosum</i> , Forst.	88	<i>bellidioides</i> , Hook. f.	338
<i>potentilloides</i> , Hook. f.	89	<i>Colensoi</i> , Hook. f.	341
<i>retrosum</i> , L'Herit.	88	<i>collinum</i> , Labill.	327
		<i>Cunninghamii</i> , D.C.	326

	Page		Page
<i>Gnaphalium</i> — <i>continued</i> .		<i>Gunnera</i> — <i>continued</i> .	
<i>filicaulis</i> , Hook. f.	339	<i>monoica</i> , Raoul	153
<i>involucratum</i> , Forst.	326	<i>ovata</i> , Petrie	154
<i>japonicum</i> , Thunb.	326	<i>prorepens</i> , Hook. f.	155
<i>Keriense</i> , A. Cunn.	323	<i>strigosa</i> , Col.	154
<i>lanatum</i> , Forst.	326	<i>Gymnococca arenaria</i> , Fisch. & Mey.	612
<i>luteo-album</i> , Linn.	326	<i>microcarpa</i> , Fisch. & Mey.	613
<i>Lyallii</i> , Hook. f.	323	<i>Gymnogramme</i> , Desv.	1015
<i>minutulum</i> , Col.	325	<i>alpina</i> , Potts	1016
<i>nitidulum</i> , Hook. f.	325	<i>leptophylla</i> , Desv.	1016
<i>novæ-zealandiæ</i> , Sch. Bp.	324	<i>novæ-zealandiæ</i> , Col.	1016
<i>paludosum</i> , Petrie	325	<i>Pozoi</i> , Kunze	1016
<i>parviflorum</i> , Col.	1142	<i>rutæfolia</i> , Hook. & Grev.	1016, 1157
<i>prostratum</i> , Hook. f.	338	<i>Gymnostichum gracile</i> , Hook. f.	924
<i>purpureum</i> , Linn.	1076	<i>Gynerium zelandicum</i> , Steud.	894
<i>simplex</i> , A. Rich.	327	<i>Gypsophila</i> , Linn.	62
<i>subrigidum</i> , Col.	324, 1142	<i>tubulosa</i> , Boiss.	62
<i>Traversii</i> , Hook. f.	324, 1142		
<i>trinerve</i> , Forst.	323	<i>Haastia</i> , Hook. f.	320
<i>virgatum</i> , Banks and Soland.	326	<i>Greenii</i> , Hook. f.	321
<i>Gomphocarpus fruticosus</i> , R. Br.	1080	<i>Loganii</i> , Buch.	340
<i>Gonicarpus citriodorus</i> , A. Cunn.	150	<i>montana</i> , Buch.	321
<i>depressus</i> , A. Cunn.	149	<i>pulvinaris</i> , Hook. f.	320
<i>serpyllifolius</i> , Hook. f.	149	<i>recurva</i> , Hook. f.	321
<i>teragynus</i> , Labill.	149	<i>Sinclairii</i> , Hook. f.	321
<i>vernicosus</i> , Hook. f.	149	<i>Hakea acicularis</i> , R. Br.	1086
<i>Goniopteris pennigera</i> , J. Smith	1009	<i>HALORAGÆ</i>	147
<i>Goodenia repens</i> , Labill.	395	<i>Haloragis</i> , Forst.	148
<i>GOODENIÆ</i>	394	<i>aggregata</i> , Buch.	149
<i>GRAMINEÆ</i>	838, 1089, 1155	<i>alata</i> , Jacq.	148
<i>Grammitis australis</i> , R. Br.	1010	<i>bibracteolata</i> , Col.	149
<i>ciliata</i> , Col.	1010	<i>cartilaginea</i> , Cheesem.	148
<i>heterophylla</i> , Labill.	1011	<i>depressa</i> , Walp.	149
<i>humilis</i> , Homb. & Jacq.	1010	<i>micrantha</i> , R. Br.	150
<i>leptophylla</i> , Swz.	1016	<i>minima</i> , Col.	150
<i>pumila</i> , Armstr.	1010	<i>spicata</i> , Petrie	150
<i>rigida</i> , Homb. & Jacq.	1010	<i>tenella</i> , Brong.	150
<i>rutæfolia</i> , R. Br.	1016	<i>tetragyna</i> , Hook. f.	149
<i>Gratiola</i> , Linn.	486	<i>uniflora</i> , T. Kirk	149
<i>concinna</i> , Col.	487	<i>Hamelinia veratroides</i> , A. Rich.	711
<i>glandulifera</i> , Col.	487	<i>Hartighsea spectabilis</i> , A. Juss.	96
<i>latifolia</i> , R. Br.	487	<i>Haxtonia furfuracea</i> , A. Cunn.	284
<i>nana</i> , Benth.	487	<i>Hectorella</i> , Hook. f.	72
<i>peruviana</i> , Linn.	486	<i>cæspitosa</i> , Hook. f.	72
<i>pubescens</i> , Hook. f.	487	<i>elongata</i> , Buch.	73
<i>sexdentata</i> , A. Cunn.	487	<i>Hedera crassifolia</i> , A. Gray	235
<i>Griselinia</i> , Forst.	238	<i>Helix</i> , Linn.	1075
<i>littoralis</i> , Raoul	239	<i>Lessonii</i> , A. Gray	234
<i>lucida</i> , Forst.	238	<i>Hedycarya</i> , Forst.	599
<i>Gunnera</i> , Linn.	152	<i>arborea</i> , Forst.	599, 1147
<i>arenaria</i> , Cheesem.	156	<i>dentata</i> , Forst.	600
<i>flavida</i> , Col.	155	<i>scabra</i> , A. Cunn.	600
<i>densiflora</i> , Hook. f.	156	<i>Hekaterosachne elatior</i> , Steud.	849
<i>dentata</i> , T. Kirk	156	<i>Helenium quadridentatum</i> , Labill.	1076
<i>Hamiltoni</i> , T. Kirk	157	<i>Helichrysum</i> , Vaill.	336, 1076
<i>microcarpa</i> , T. Kirk	154	<i>bellidioides</i> , Willd.	337
<i>mixta</i> , T. Kirk	154		

	Page		Page
<i>Helichrysum</i> —continued.		<i>Holcus lanatus</i> , Linn. . .	1090
<i>coralloides</i> , Benth. & Hook. f. 343,	1142	<i>mollis</i> , Linn. . .	1090
<i>cymosum</i> , Less. . .	1076	<i>redolens</i> , Forst. . .	855
<i>depressum</i> , Benth. & Hook. f. . .	342	<i>Homalanthus</i> , A. Juss. . .	630
<i>fasciculatum</i> , Buch. . .	340	<i>nutans</i> , Hook. f. . .	630
<i>filicaule</i> , Hook. f. . .	338, 1142	<i>polyandrus</i> , Cheesem. . .	630
<i>glomeratum</i> , Benth. & Hook. f. . .	341	<i>Hookerella tenuiflora</i> , Van Tiegh. . .	1150
<i>grandiceps</i> , Hook. f. . .	341	<i>Hordeum maritimum</i> , With. . .	1093
<i>lanceolatum</i> , T. Kirk . .	342	<i>murinum</i> , Linn. . .	1093
<i>Leontopodium</i> , Hook. f. . .	340, 1142	<i>vulgare</i> , Linn. . .	1093
<i>Loganii</i> , T. Kirk . .	340	<i>Humulus Lupulus</i> , Linn. . .	1087
<i>micranthum</i> , A. Cunn. . .	324	<i>Huttonella compacta</i> , T. Kirk . .	118
<i>microphyllum</i> , Benth. & Hook. f. . .	342	<i>curta</i> , T. Kirk . .	118
<i>pauciflorum</i> , T. Kirk . .	344	<i>juncea</i> , T. Kirk . .	118
<i>prostratum</i> , Hook. f. . .	338	<i>prona</i> , T. Kirk . .	119
<i>Purdiei</i> , Petrie . .	338	HYDROCHARIDÆ . .	1087
<i>Selago</i> , Benth. & Hook. f. . .	343	<i>Hydrocotyle</i> , Linn. . .	194
<i>Sinclairii</i> , Hook. f. . .	339	<i>alsophila</i> , Col. . .	197
<i>Youngii</i> , Hook. f. . .	339	<i>amœna</i> , Col. . .	197
<i>Helophyllum clavigerum</i> , Hook. f. . .	390	<i>americana</i> , Linn. . .	196
<i>Colensoi</i> , Hook. f. . .	390	<i>asiatica</i> , Linn. . .	198
<i>muscoïdes</i> , Col. . .	390	<i>colorata</i> , Col. . .	1137
<i>rubrum</i> , Hook. f. . .	391	<i>compacta</i> , A. Rich. . .	1137
<i>Hemiphues bellidioides</i> , Hook. f. . .	204	<i>concinna</i> , Col. . .	195
<i>novæ-zealandiæ</i> , Petrie . .	1138	<i>cordifolia</i> , Hook. f. . .	199
<i>suffocata</i> , Hook. f. . .	204	<i>dichondræfolia</i> , A. Cunn. . .	197
<i>Hemitelia</i> , R. Br. . .	950	<i>dissecta</i> , Hook. f. . .	196
<i>falciloba</i> , Col. . .	948	<i>echinella</i> , Col. . .	195
<i>microphylla</i> , Col. . .	951	<i>elongata</i> , A. Cunn. . .	195
<i>Smithii</i> , Hook. . .	951	<i>heteromeria</i> , A. Rich. . .	196
<i>stellulata</i> , Col. . .	951	<i>hydrophila</i> , Petrie . .	195
<i>Herniaria hirsuta</i> , Linn. . .	1085	<i>intermixta</i> , Col. . .	197
<i>Herpolirion</i> , Hook. f. . .	720	<i>involutrata</i> , Col. . .	197
<i>novæ-zealandiæ</i> , Hook. f. . .	720	<i>microphylla</i> , A. Cunn. . .	198
<i>Tasmaniæ</i> , Hook. f. . .	720	<i>moschata</i> , Forst. . .	197, 1137
<i>Hesperis matronalis</i> , Linn. . .	1064	<i>muscosa</i> , R. Br. . .	195
<i>Heterixia amentacea</i> , Van Tiegh. . .	1151	<i>nitens</i> , Col. . .	196
<i>Lindsayi</i> , Van Tiegh. . .	1150	<i>novæ-zealandiæ</i> , D.C. . .	197
<i>Hibiscus</i> , Linn. . .	80	<i>pterocarpa</i> , F. Muell. . .	196
<i>diversifolius</i> , Jacq. . .	81	<i>robusta</i> , T. Kirk . .	197
<i>trionum</i> , Linn. . .	81	<i>sibthorpioides</i> , Col. . .	198
<i>vesicarius</i> , Cav. . .	81	<i>tripartita</i> , R. Br. . .	195
<i>Hierochloe</i> , Gmel. . .	854	<i>uniflora</i> , Col. . .	199
<i>alpina</i> , Roem. & Schult. . .	856	<i>Hymenanthera</i> , R. Br. . .	48
<i>antarctica</i> , R. Br. . .	855	<i>chathamica</i> , T. Kirk. . .	51
<i>borealis</i> , Hook. f. . .	856	<i>crassifolia</i> , Hook. f. . .	48
<i>Brunonis</i> , Hook. f. . .	856	<i>dentata</i> , R. Br. . .	49
<i>Fraseri</i> , Hook. f. . .	855	<i>latifolia</i> , Endl. . .	50
<i>redolens</i> , R. Br. . .	855	<i>obovata</i> , T. Kirk . .	50
<i>Histiopteris incisa</i> , Aghard . .	974	<i>Traversii</i> , Buch. . .	30
<i>Hoheria</i> , A. Cunn. . .	78	<i>Hymenophyllum</i> , Linn. . .	928
<i>angustifolia</i> , Raoul . .	79	<i>œruginosum</i> , Hook. . .	937
<i>Lyallii</i> , Hook. f. . .	80	<i>alpinum</i> , Col. . .	941
<i>populnea</i> , A. Cunn. . .	78	<i>Armstrongii</i> , T. Kirk . .	938
<i>sexstylosa</i> , Col. . .	79	<i>atrovirens</i> , Col. . .	933
<i>Sinclairii</i> , Hook. f. . .	79	<i>australe</i> , Willd. . .	932
		<i>bivalve</i> , Swz. . .	941

	Page		Page
Hymenophyllum—continued.		Hypolepis—continued.	
<i>Boryanum</i> , Willd.	937	<i>millefolium</i> , Hook.	965
<i>Cheesemānii</i> , Bak.	938	<i>tenuifolia</i> , Bernh.	965
<i>ciliatum</i> , Swz.	937	<i>Hypolæna</i> , R. Br.	761
<i>crispatum</i> , Wall.	932	<i>lateriflora</i> , Bernh.	761
<i>cupressiforme</i> , Labill.	940	<i>Hypoxis</i> , Linn.	701
<i>demissum</i> , Swz.	934	<i>hygrometrica</i> , Hook. f.	701
<i>dilatatum</i> , Swz.	934	<i>pusilla</i> , Hook. f.	701, 1153
<i>erecto-alatum</i> , Col.	934	<i>Hystericina alopecurioides</i> , Steud.	859
<i>flabellatum</i> , Labill.	935		
<i>flezuosum</i> , A. Cunn.	932	<i>Iberis amara</i> , Linn.	1066
<i>Franklinianum</i> , Col.	937	<i>Ileostylus Kirkii</i> , Van. Tiegh.	1149
<i>imbricatum</i> , Col.	931	<i>micranthus</i> , Van Tiegh.	1149
<i>javanicum</i> , Spreng.	932	ILLECEBRACEÆ	575, 1085
<i>lophocarpum</i> , Col.	931	<i>Imperata</i> , Cyr.	842
<i>Lyallii</i> , Hook. f.	943	<i>arundinacea</i> , Cyr.	843
<i>Malingii</i> , Mett.	938	<i>Cheesemanii</i> , Hack.	843
<i>megalocarpum</i> , Col.	934	<i>exaltata</i> , Brong.	844
<i>melanocheilos</i> , Col.	938	<i>Indigofera viscosa</i> , Lam.	1071
<i>minimum</i> , A. Rich.	939	<i>Ionidium filiforme</i> , F. Muell.	1066
<i>montanum</i> , T. Kirk	933	<i>Iphigenia</i> , Kunth	720
<i>multifidum</i> , Swz.	940	<i>novæ-zealandiæ</i> , Bak.	721
<i>nitens</i> , R. Br.	936	<i>Ipomæa</i> , Linn.	474, 1081
<i>oligocarpum</i> , Col.	941	<i>batatas</i> , Lam.	474, 1081
<i>polyanthos</i> , Swz.	931	<i>biloba</i> , Forsk.	474
<i>polychilum</i> , Col.	934	<i>palmata</i> , Forsk.	474
<i>pulcherrimum</i> , Col.	933	<i>pendula</i> , R. Br.	474
<i>pusillum</i> , Col.	940	<i>pes-capræ</i> , Roth	475
<i>pygmeum</i> , Col.	940	<i>tuberculata</i> , Roem. & Schult.	474
<i>rarum</i> , R. Br.	930	IRIDEÆ	698, 1087
<i>revolutum</i> , Col.	940	<i>Iris germanica</i> , Linn.	1087
<i>rufescens</i> , T. Kirk	936, 1157	<i>pseudacorus</i> , Linn.	1088
<i>sanguinolentum</i> , Swz.	931	<i>Isachne</i> , R. Br.	846
<i>scabrum</i> , A. Rich.	935	<i>australis</i> , R. Br.	847, 1155
<i>semi-bivalve</i> , Hook. & Grev.	931	ISOETACEÆ	1042
<i>spathulatum</i> , Col.	941	<i>Isoetes</i> , Linn.	1042
<i>subtilissimum</i> , Kunze	937	<i>alpinus</i> , T. Kirk	1043
<i>truncatum</i> , Col.	941	<i>Kirkii</i> , A. Braun	1043
<i>Tunbridgense</i> , Smith	939	<i>multiangularis</i> , Col.	1043
<i>unilaterale</i> , Willd.	940	<i>Isolepis acicularis</i> , A. Rich.	769
<i>villosum</i> , Col.	931	<i>alpina</i> , Hook. f.	773
<i>Wilsoni</i> , Hook.	940	<i>aucklandica</i> , Hook. f.	773
<i>zeelandicum</i> , Van der Bosch.	940	<i>basilaris</i> , Hook. f.	772
<i>Hyoscyamus niger</i> , Linn.	1082	<i>cartilaginea</i> , R. Br.	774
HYPERICINÆ	74, 1068	<i>fluitans</i> , R. Br.	772
<i>Hypericum</i> , Linn.	74, 1068	<i>globosa</i> , Buch.	776
<i>Androsæmum</i> , Linn.	1038	<i>inundata</i> , R. Br.	775
<i>gramineum</i> , Forst.	74	<i>lenticularis</i> , R. Br.	772
<i>humifusum</i> , Linn.	75, 1068	<i>nodosa</i> , R. Br.	776
<i>japonicum</i> , Thunb.	75	<i>novæ-zealandiæ</i> , Col.	772
<i>perforatum</i> , Linn.	1068	<i>prolifer</i> , Hook. f.	775
<i>pusillum</i> , Choisy	75	<i>prolifer</i> , R. Br.	776
<i>Hypochaeris glabra</i> , Linn.	1079	<i>riparia</i> , R. Br.	774
<i>radicata</i> , Linn.	1079	<i>setacea</i> , Hook. f.	774, 775
<i>Hypolepis</i> , Bernh.	964	<i>setosa</i> , Raoul	774
<i>dicksonoides</i> , Hook.	965	<i>spiralis</i> , A. Rich.	777
<i>distans</i> , Hook.	966	<i>subcucullata</i> , Berggr.	773

	Page		Page
<i>Isotoma</i> , <i>Lindl.</i> ..	401	<i>Knightia</i> , <i>R. Br.</i> ..	606
<i>fluviatilis</i> , <i>F. Muell.</i> ..	401	<i>excelsa</i> , <i>R. Br.</i> ..	606
<i>Ixalum inerme</i> , <i>Forst.</i> ..	850	<i>Kyllinga</i> , <i>Rottb.</i> ..	764
<i>Ixerba</i> , <i>A. Cunn.</i> ..	136	<i>brevifolia</i> , <i>Rottb.</i> ..	764
<i>brexioides</i> , <i>A. Cunn.</i> ..	136	<i>monocephala</i> , <i>Rottb.</i> ..	764
JUNCACEÆ	721, 1088	LABIATÆ	567, 1083
<i>Juncus</i> , <i>Linn.</i> ..	723, 1088	<i>Lactuca muralis</i> , <i>E. Mey.</i> ..	1079
<i>antarcticus</i> , <i>Hook. f.</i> ..	729	<i>saligna</i> , <i>Linn.</i> ..	1079
<i>australis</i> , <i>Hook. f.</i> ..	726	<i>Lagenaria vulgaris</i> , <i>Ser.</i> ..	1074
<i>brevifolius</i> , <i>T. Kirk</i> ..	730	<i>Lagenphora</i> , <i>Cass.</i> ..	271, 1076
<i>bufonius</i> , <i>Linn.</i> ..	728	<i>Barkeri</i> , <i>T. Kirk</i> ..	273
<i>cæspiticius</i> , <i>E. Mey.</i> ..	729	<i>emphysopus</i> , <i>Hook. f.</i> ..	272, 1076
<i>capillaceus</i> , <i>Hook. f.</i> ..	733	<i>Forsteri</i> , <i>D.C.</i> ..	272
<i>cephalotes</i> , <i>Hook. f.</i> ..	731	<i>lanata</i> , <i>A. Cunn.</i> ..	274
<i>communis</i> , <i>E. Mey.</i> ..	727	<i>linearis</i> , <i>Petrie</i> ..	272
<i>effusus</i> , <i>Linn.</i> ..	726	<i>petiolata</i> , <i>Hook. f.</i> ..	273
<i>Gerardi</i> , <i>Lois.</i> ..	1088	<i>pinnatifida</i> , <i>Hook. f.</i> ..	274
<i>glauus</i> , <i>Sibth.</i> ..	1088	<i>purpurea</i> , <i>T. Kirk</i> ..	273
<i>holoschœnus</i> , <i>R. Br.</i> ..	730	<i>strangulata</i> , <i>Col.</i> ..	273
<i>involutatus</i> , <i>T. Kirk</i> ..	728	<i>Lagurus ovatus</i> , <i>Linn.</i> ..	1090
<i>lampocarpus</i> , <i>Ehr.</i> ..	731	<i>Lamium purpureum</i> , <i>Lam.</i> ..	1084
<i>luxurians</i> , <i>Col.</i> ..	727	<i>Lampocarya affinis</i> , <i>Brong.</i> ..	795
<i>macrostigma</i> , <i>Col.</i> ..	725	<i>lacera</i> , <i>A. Rich.</i> ..	795
<i>magellanicus</i> , <i>Lam.</i> ..	722	<i>setifolia</i> , <i>A. Rich.</i> ..	792
<i>maritimus</i> , <i>Lam.</i> ..	727	<i>tenax</i> , <i>Hook. f.</i> ..	788
<i>novæ-zealandiæ</i> , <i>Hook. f.</i> ..	732	<i>xanthocarpa</i> , <i>Hook. f.</i> ..	794
<i>obtusiflorus</i> , <i>Ehr.</i> ..	1088	<i>Lapsana communis</i> , <i>Linn.</i> ..	1078
<i>pallidus</i> , <i>R. Br.</i> ..	724	<i>Lathyrus latifolius</i> , <i>Linn.</i> ..	1072
<i>pauciflorus</i> , <i>R. Br.</i> ..	725	<i>odoratus</i> , <i>Linn.</i> ..	1072
<i>pauciflorus</i> , <i>T. Kirk</i> ..	730	<i>Laurelia</i> , <i>Juss.</i> ..	600
<i>planifolius</i> , <i>R. Br.</i> ..	728	<i>novæ-zealandiæ</i> , <i>A. Cunn.</i> ..	600
<i>polyanthemus</i> , <i>Buchen.</i> ..	727	LAURINEÆ	601
<i>prismatocarpus</i> , <i>R. Br.</i> ..	730	<i>Laurus calicaris</i> , <i>Soland.</i> ..	603
<i>prismatocarpus</i> , <i>Benth.</i> ..	731	<i>Tarairi</i> , <i>A. Cunn.</i> ..	602
<i>pusillus</i> , <i>Buchen.</i> ..	732	<i>Tawa</i> , <i>A. Cunn.</i> ..	602
<i>scheuchzerioides</i> , <i>Gaud</i> ..	731	<i>Victoriana</i> , <i>Col.</i> ..	602
<i>tenax</i> , <i>Banks & Soland</i> ..	725	<i>Lavatera arborea</i> , <i>Linn.</i> ..	1068
<i>tenuis</i> , <i>Willd.</i> ..	728	LEGUMINOSÆ ..	107, 1069, 1136
<i>vaginatus</i> , <i>R. Br.</i> ..	726	<i>Leiospermum racemosum</i> , <i>Don.</i> ..	139
<i>vaginatus</i> , <i>Hook. f.</i> ..	725	<i>Lemna</i> , <i>Linn.</i> ..	745
<i>Kelleria Dieffenbachii</i> , <i>Endl.</i> ..	616	<i>gibba</i> , <i>Linn.</i> ..	745
<i>villosa</i> , <i>Berggr.</i> ..	616	<i>minor</i> , <i>Linn.</i> ..	745
<i>Kentia Baueri</i> , <i>Seem.</i> ..	740	LEMNACEÆ	744
<i>sapida</i> , <i>Mart.</i> ..	740	<i>Lens esculanta</i> , <i>Moench</i> ..	1072
<i>Koeleria</i> , <i>Pers.</i> ..	897	LENTIBULARIÆ ..	558
<i>cristata</i> , <i>Pers.</i> ..	897	<i>Leontodon autumnalis</i> , <i>Linn.</i> ..	1079
<i>cristata</i> , <i>Hook. f.</i> ..	897	<i>hirtus</i> , <i>Linn.</i> ..	1079
<i>Kurtzii</i> , <i>Hack.</i> ..	897	<i>hispidus</i> , <i>Linn.</i> ..	1079
<i>micrathera</i> , <i>Griseb.</i> ..	897	<i>Lepidium</i> , <i>Linn.</i> ..	37, 1065
<i>Korthalsella</i> , <i>Van Tiegh.</i> ..	1150	<i>australe</i> , <i>T. Kirk</i> ..	41
<i>amentacea</i> , <i>Engl.</i> ..	1151	<i>Banksii</i> , <i>T. Kirk</i> ..	39
<i>clavata</i> , <i>Cheesem.</i> ..	1151	<i>campestre</i> , <i>R. Br.</i> ..	1065
<i>Lindsayi</i> , <i>Engl.</i> ..	1150	<i>Draba</i> , <i>Linn.</i> ..	1065
<i>salicornioides</i> , <i>Van Tiegh.</i> ..	1150	<i>flexicaule</i> , <i>T. Kirk</i> ..	40
		<i>hirtum</i> , <i>Smith</i> ..	1065
		<i>Kawarau</i> , <i>Petrie</i> ..	41

	Page		Page
<i>Lepidium</i> —continued.		<i>Libertia</i> , Spreng. ..	698
<i>Kirkii</i> , Petrie ..	40	<i>grandiflora</i> , Sweet ..	699
<i>incisum</i> , Hook. f. ..	40	<i>ixioides</i> , Spreng. ..	699
<i>Matau</i> , Petrie ..	41	<i>macrocarpa</i> , Klatt ..	700
<i>obtusatum</i> , T. Kirk ..	39	<i>micrantha</i> , A. Cunn. ..	700
<i>oleraceum</i> , Forst. ..	38	<i>orbicularis</i> , Col. ..	699
<i>ruderales</i> , Linn. ..	1065	<i>pulchella</i> , Spreng. ..	700
<i>sativum</i> , Linn. ..	1066	<i>restioides</i> , Klatt ..	699
<i>sisymbrioides</i> , Hook. f. ..	42	<i>Libocedrus</i> , Endl. ..	646
<i>Solandri</i> , T. Kirk ..	42	<i>Bidwillii</i> , Hook. f. ..	647
<i>tenuicaule</i> , T. Kirk ..	40	<i>Doniana</i> , Endl. ..	646
<i>Lepidosperma</i> , Labill. ..	789	<i>Ligusticum</i> , Linn. ..	214
<i>australe</i> , Hook. f. ..	789	<i>Aciphylla</i> , Spreng. ..	209
<i>Colensoi</i> , Boeck. ..	788	<i>acutifolium</i> , T. Kirk ..	216
<i>concavum</i> , Hook. f. ..	790	<i>antipodium</i> , Homb. & Jacq. 216,	1139
<i>filiforme</i> , Labill. ..	790	<i>aromaticum</i> , Hook. f. ..	220
<i>laterale</i> , R. Br. ..	790	<i>brevistyle</i> , Hook. f. ..	218
<i>longitudinalis</i> , Hook. f. ..	790	<i>carnosulum</i> , Hook. f. ..	219, 1139
<i>tetragonum</i> , Hook. f. ..	789	<i>decipiens</i> , T. Kirk ..	223
<i>striatum</i> , Hook. f. ..	788	<i>deltoidium</i> , Cheesem. ..	219, 1139
<i>Lepilana</i> , J. Drumm. ..	752	<i>Dieffenbachii</i> , Hook. f. ..	214
<i>bilocularis</i> , T. Kirk ..	753	<i>dissectum</i> , T. Kirk ..	218
<i>Preissii</i> , F. Muell. ..	753	<i>diversifolium</i> , Cheesem. ..	1139
<i>Leptinella dioica</i> , Hook. f. ..	359	<i>Enysii</i> , T. Kirk ..	221
<i>Featherstonii</i> , F. Muell. ..	357	<i>filifolium</i> , Hook. f. ..	218
<i>lanata</i> , Hook. f. ..	353	<i>flabellatum</i> , T. Kirk ..	222
<i>minor</i> , Hook. f. ..	355	<i>Gingidium</i> , Forst. ..	223
<i>plumosa</i> , Hook. f. ..	353	<i>Haastii</i> , F. Muell. ..	217
<i>potentillina</i> , F. Muell. ..	353	<i>imbricatum</i> , Hook. f. ..	221
<i>propinqua</i> , Hook. f. ..	353	<i>intermedium</i> , Hook. f. ..	217
<i>pusilla</i> , Hook. f. ..	358	<i>latifolium</i> , Hook. f. ..	215
<i>squalida</i> , Hook. f. ..	358	<i>Lyallii</i> , Hook. f. ..	217
<i>Leptocarpus</i> , R. Br. ..	760	<i>patulum</i> , T. Kirk ..	220
<i>simplex</i> , A. Rich. ..	761	<i>piliferum</i> , Hook. f. ..	220
<i>Leptolepia novæ-zealandiæ</i> , Metten. ..	956	<i>politum</i> , T. Kirk ..	213
<i>Leptopteris hymenophylloides</i> , Presl. ..	1025	<i>trifoliolatum</i> , Hook. f. ..	224
<i>superba</i> , Hook. ..	1025	LILIACEÆ ..	701, 1088, 1153
<i>Leptospermum</i> , Forst. ..	160	<i>Limosella</i> , Linn. ..	489
<i>ericoides</i> , A. Rich. ..	161	<i>aquatica</i> , Linn. ..	489
<i>perforatum</i> , Forst. ..	167	<i>australis</i> , R. Br. ..	489
<i>scandens</i> , Forst. ..	163	<i>ciliata</i> , Col. ..	489
<i>scoparium</i> , Forst. ..	160, 1137	<i>Curdieana</i> , F. Muell. ..	489
<i>Sinclairii</i> , T. Kirk ..	161	<i>tenuifolia</i> , Nutt. ..	489
<i>Lepturus incurvatus</i> , Trin. ..	1093	<i>Linaria cymbalaria</i> , Mill. ..	1032
<i>Lepyrodia</i> , R. Br. ..	759	<i>Elatine</i> , Mill. ..	1082
<i>Traversii</i> , F. Muell. ..	760	<i>latifolia</i> , Desv. ..	1082
<i>Leucopogon</i> , R. Br. ..	413	<i>purpurea</i> , Mill. ..	1082
<i>Bellignianus</i> , Raoul ..	415	<i>vulgaris</i> , Linn. ..	1082
<i>brevibarbis</i> , Steheg. ..	414	<i>Lindsaya</i> , Dryand. ..	957
<i>Colensoi</i> , Hook. f. ..	412	<i>discolor</i> , Col. ..	959
<i>fasciculatus</i> , A. Rich. ..	413	<i>linearis</i> , Swz. ..	958
<i>Forsteri</i> , A. Rich. ..	411	<i>Lessonii</i> , Bory ..	959
<i>Fraseri</i> , A. Cunn. ..	414, 1143	<i>microphylla</i> , Hook. & Bak. ..	959
<i>heterophyllum</i> , Col. ..	1143	<i>trichomanoides</i> , Dryand. ..	958
<i>nesophilus</i> , D.C. ..	415	<i>trilobata</i> , Col. ..	958
<i>Richei</i> , R. Br. ..	414	<i>viridis</i> , Col. ..	959
<i>Leycesteria formosa</i> , Wall. ..	1075	LINEÆ ..	86, 1069

	Page		Page
<i>Linum</i> , Linn.	86	<i>Lomaria</i> —continued.	
<i>catharticum</i> , Linn.	1069	<i>linearis</i> , Col.	980
<i>gallicum</i> , Linn.	1069	<i>membranacea</i> , Col.	984
<i>marginale</i> , A. Cunn.	86, 1069	<i>nigra</i> , Col.	982
<i>monogynum</i> , Forst.	86	<i>Norfolkiana</i> , Heward	977
<i>usitatissimum</i> , Linn.	1069	<i>oligoneuron</i> , Col.	984
<i>Liparophyllum</i> , Hook. f.	456	<i>parvifolia</i> , Col.	980
<i>Gunnii</i> , Hook. f.	456	<i>Patersoni</i> , Spreng.	975
<i>Lithospermum arvense</i> , Linn.	1081	<i>paucijuga</i> , Col.	977
<i>Litobrochia comans</i> , Presl.	972	<i>pimpinellifolia</i> , Hook. f.	982
<i>incisa</i> , Presl.	974	<i>procera</i> , Spreng.	981
<i>macilenta</i> , Brack.	973	<i>propinqua</i> , A. Cunn.	982
<i>vespertilionis</i> , Presl.	974	<i>pumila</i> , Raoul.	980
<i>Litsæa</i> , Lam.	603	<i>pygmæa</i> , Col.	984
<i>calicaris</i> , Benth. & Hook. f.	603	<i>rotundifolia</i> , Raoul	983
<i>Lobelia</i> , Linn.	399	<i>rigida</i> , J. Smith	979
<i>alata</i> , Labill.	400	<i>vulcanica</i> , Blume	977
<i>anceps</i> , Linn. f.	399	<i>Lonchites tenuifolia</i> , Forst.	965
<i>angulata</i> , Forst.	398	LORANTHACEÆ	617, 1148
<i>fluviatilis</i> , R. Br.	401	<i>Loranthus</i> , Linn.	618, 1148
<i>linnæoides</i> , Petrie	400	<i>Adamsii</i> , Cheesem.	620, 1149
<i>littoralis</i> , R. Cunn.	398	<i>Colensoi</i> , Hook. f.	619, 1148
<i>perpusilla</i> , Hook. f.	398	<i>decussatus</i> , T. Kirk	619, 1149
<i>physaloides</i> , Hook. f.	397	<i>Fieldii</i> , Buch.	1149
<i>Roughii</i> , Hook. f.	400	<i>flavidus</i> , Hook. f.	620, 1149
<i>rugulosa</i> , R. Grah.	398	<i>micranthus</i> , Hook. f.	618, 1149
<i>submersa</i> , A. Cunn.	488	<i>polychroa</i> , Col.	620, 1149
<i>Logania</i> , R. Br.	443	<i>punctatus</i> , Col.	619, 1148
<i>Armstrongii</i> , Buch.	443, 536	<i>tenuiflorus</i> , Hook. f.	620, 1150
<i>ciliolata</i> , Hook. f.	443, 528	<i>tetrapetalus</i> , Forst.	619, 1148
<i>depressa</i> , Hook. f.	443, 1144	<i>Lotus angustissimus</i> , Linn.	1071
<i>tetragona</i> , Hook. f.	443, 536	<i>arboreus</i> , Forst.	117
LOGANIACEÆ	441, 1144	<i>corniculatus</i> , Linn.	1071
<i>Lolium italicum</i> , A. Beauv.	1093	<i>uliginosus</i> , Schkuhr.	1071
<i>perenne</i> , Linn.	1093	<i>Loxosoma</i> , R. Br.	946
<i>temulentum</i> , Linn.	093	<i>Cunninghamii</i> , R. Br.	947
<i>Lomaria</i> , Willd.	974	<i>Lupinus arboreus</i> , Sims	1069
<i>acuminata</i> , Bak.	978	<i>Luzula</i> , D.C.	733
<i>aggregata</i> , Col.	978	<i>australasica</i> , Steud.	737
<i>alpina</i> , Spreng.	980	<i>Banksiana</i> , E. Mey.	737
<i>attenuata</i> , Hook. f.	978	<i>campestris</i> , D.C.	736
<i>Banksii</i> , Hook. f.	979	<i>Cheesemani</i> , Buchen.	735
<i>capensis</i> , Willd.	980, 1157	<i>Colensoi</i> , Hook. f.	734
<i>Colensoi</i> , Hook. f.	976	<i>crenulata</i> , Buchen.	734
<i>deflexa</i> , Col.	977	<i>crinita</i> , Hook. f.	737
<i>deltoides</i> , Col.	977	<i>leptophylla</i> , Buchen.	736
<i>discolor</i> , Willd.	976	<i>micrantha</i> , Buchen.	734
<i>duplicata</i> , Potts	981	<i>Oldfeldii</i> , Hook. f.	737
<i>dura</i> , Moore	978	<i>picta</i> , A. Rich.	737
<i>elongata</i> , Blume	976	<i>pumila</i> , Hook. f.	735
<i>filiformis</i> , A. Cunn.	982	<i>racemosa</i> , Desf.	738
<i>fluviatilis</i> , Spreng.	983	<i>rhadina</i> , Buchen.	736
<i>Fraseri</i> , A. Cunn.	984	<i>subclavata</i> , Col.	737
<i>heterophylla</i> , Col.	976	<i>triandra</i> , Buchen.	734
<i>intermedia</i> , Col.	984	<i>Wettsteinii</i> , Buchen.	737
<i>lanceolata</i> , Spreng.	978	<i>Luzuriaga parviflora</i> , Kunth	704
<i>latifolia</i> , Col.	981		

	Page		Page
<i>Lychnis coronaria</i> , Desr. . .	1067	<i>Marattia</i> , Smith . . .	1026
<i>Flos-cuculi</i> , Linn. . .	1067	<i>fraxinea</i> , Smith . . .	1026
<i>Githago</i> , Scop. . .	1067	<i>salicina</i> , Smith . . .	1026
<i>vespertina</i> , Sibth. . .	1067	<i>Mariscus</i> , Gaertn. . .	766
<i>Lycium chinense</i> , Mill. . .	1081	<i>ustulatus</i> , C. B. Clarke . .	766
<i>Lycopersicum esculentum</i> , Mill. . .	1081	<i>Marrubium vulgare</i> , Linn. . .	1084
LYCOPODIACEÆ . . .	1032	MARSILEACEÆ . . .	1030
<i>Lycopodium</i> , Linn. . .	1033	<i>Marsippospermum gracile</i> , Buchen. . .	723
<i>Billardieri</i> , Spring. . .	1036	<i>Matthiola incana</i> , R. Br. . .	1064
<i>carolinianum</i> , Linn. . .	1038	<i>Matricaria chamomilla</i> , Linn. . .	1077
<i>carolinianum</i> , Hook. f. . .	1038	<i>discoidea</i> , D.C. . .	1077
<i>cernuum</i> , Linn. . .	1037	<i>inodora</i> , Linn. . .	1077
<i>clavatum</i> , Linn. . .	1039	<i>Mazus</i> , Lour. . .	485
<i>consimilis</i> , Col. . .	1038	<i>pumilio</i> , R. Br. . .	485
<i>curvifolium</i> , Col. . .	1039	<i>radicans</i> , Cheesem. . .	486, 1146
<i>decurrens</i> , Col. . .	1039	<i>rugosus</i> , Lour. . .	485
<i>densum</i> , Labill. . .	1036	<i>Medicago denticulata</i> , Linn. . .	1070
<i>diffusum</i> , R. Br. . .	1038	<i>lupulina</i> , Linn. . .	1070
<i>distans</i> , Col. . .	1039	<i>maculata</i> , Willd. . .	1070
<i>Drummondii</i> , Spring. . .	1038, 1157	<i>sativa</i> , Linn. . .	1070
<i>D'Urvillei</i> , A. Rich. . .	1040	<i>Melaleuca florida</i> , Forst. . .	163
<i>fastigiatum</i> , R. Br. . .	1039	<i>lucida</i> , Forst. . .	163
<i>flagellaria</i> , A. Rich. . .	1036	<i>perforata</i> , Forst. . .	167
<i>Jussæi</i> , Desv. . .	1040	MELIACEÆ . . .	95
<i>laterale</i> , R. Br. . .	1037	<i>Melianthus major</i> , Linn. . .	1069
<i>Lessonianum</i> , A. Rich. . .	1039	<i>Melicope</i> , Forst. . .	93
<i>magellanicum</i> , Swz. . .	1039	<i>Mantellii</i> , Buch. . .	94
<i>novæ-zealandicum</i> , Col. . .	1036	<i>parvula</i> , Buch. . .	95
<i>phlegmaria</i> , A. Cunn. . .	1036	<i>simplex</i> , A. Cunn. . .	94
<i>polycepalum</i> , Col. . .	1037	<i>ternata</i> , Forst. . .	94
<i>ramulosum</i> , T. Kirk. . .	1038	<i>Melicytus</i> , Forst. . .	46
<i>Sanguisorba</i> , Spring. . .	1033	<i>collinus</i> , Col. . .	1134
<i>scariosum</i> , Forst. . .	1039	<i>lanceolatus</i> , Hook. f. . .	47
<i>scopulosum</i> , Col. . .	1039	<i>macrophyllus</i> , A. Cunn. . .	46
<i>Selago</i> , Linn. . .	1035	<i>micranthus</i> , Hook. f. . .	47
<i>serpentinum</i> , Kunze . .	1038	<i>microphyllus</i> , Col. . .	48
<i>varium</i> , R. Br. . .	1035	<i>ramiflorus</i> , Forst. . .	46
<i>volubile</i> , Forst. . .	1040	<i>Melilotus alba</i> , Desr. . .	1070
<i>Lygodium</i> , Swz. . .	1023	<i>arvensis</i> , Wallr. . .	1070
<i>articulatum</i> , A. Rich. . .	1023	<i>officinalis</i> , Lam. . .	1070
<i>gracilescens</i> , Col. . .	1023	<i>Melissa officinalis</i> , Linn. . .	1083
<i>Lyperanthus</i> , R. Br. . .	687	<i>Mentha</i> , Linn. . .	567, 1083
<i>antarcticus</i> , Hook. f. . .	687	<i>aquatica</i> , Linn. . .	1083
LYTHRARIÆ . . .	1073	<i>arvensis</i> , Linn. . .	568, 1082, 1083
<i>Lythrum Græfferi</i> , Tenore . .	1073	<i>australis</i> , R. Br. . .	1082, 1083
<i>hyssopifolium</i> , Linn. . .	1073	<i>consimilis</i> , Col. . .	568
		<i>Cunninghamii</i> , Benth. . .	568
<i>Macropiper excelsum</i> , Miq. . .	595	<i>piperita</i> , Linn. . .	568, 1083
<i>Madia sativa</i> , Molina . .	1076	<i>Pulegium</i> , Linn. . .	568, 1083
MAGNOLIACEÆ . . .	28	<i>viridis</i> , Linn. . .	568, 1083
<i>Malcolmia maritima</i> , Linn. . .	1065	<i>Mertensia dichotoma</i> , Willd. . .	1020
<i>Malva crispa</i> , Linn. . .	1068	<i>Meryta</i> , Forst. . .	231
<i>parviflora</i> , Linn. . .	1068	<i>Sinclairii</i> , Seem. . .	231
<i>rotundifolia</i> , Linn. . .	1068	<i>Mesembryanthemum</i> , Linn. . .	190, 1074
<i>sylvestris</i> , Linn. . .	1068	<i>æquilaterale</i> , Haw. . .	191
<i>verticillata</i> , Linn. . .	1068	<i>australe</i> , Soland. . .	191
MALVACEÆ . . .	75, 1068, 1135	<i>edule</i> , Linn. . .	1074

	Page		Page
<i>Metrosideros, Banks</i>	161	<i>Modiola multifida, Moench.</i> ..	1068
<i>albiflora, Soland.</i>	164	MONIMIACEÆ	598, 1147
<i>aurata, Col.</i>	163	<i>Montia, Linn.</i>	72
<i>buxifolia, A. Cunn.</i>	167	<i>fontana, Linn.</i>	72
<i>Colensoi, Hook. f.</i>	165	<i>Moræa ixioides, Thunb.</i> ..	699
<i>diffusa, Smith</i>	164	<i>Morelotia gahnæformis, Gaud</i> ..	795
<i>diffusa, A. Cunn.</i>	164	<i>Muehlenbeckia, Meissn.</i> ..	591
<i>florida, Smith</i>	162	<i>adpressa, Hook. f.</i>	592
<i>florida, Hook.</i>	166	<i>australis, Meissn.</i>	592
<i>hypericifolia, A. Cunn.</i> ..	164	<i>axillaris, Walp.</i>	593
<i>lucida, A. Rich.</i>	163	<i>complexa, Meissn.</i>	592
<i>Parkinsoni, Buch.</i>	163	<i>ephedrioides, Hook. f.</i> ..	593, 1147
<i>pendens, Col.</i>	165	<i>hypogæa, Col.</i>	593
<i>perforata, A. Rich.</i>	167	<i>microphylla, Col.</i>	593
<i>polymorpha, Gaud.</i>	167	<i>muricatula, Col.</i>	594
<i>robusta, A. Cunn.</i>	165	<i>paucifolia, Col.</i>	593
<i>scandens, Soland.</i>	167	<i>trilobata, Col.</i>	593
<i>speciosa, Col.</i>	163	<i>truncata, Col.</i>	593
<i>subsimilis, Col.</i>	165	<i>Mullerina Raoulii, Van Tiegh.</i> ..	1150
<i>tenuifolia, Col.</i>	167	MYOPORINÆ	563
<i>tomentosa, A. Rich.</i> ..	166, 1137	<i>Myoporum, Banks & Sol.</i> ..	563
<i>umbellata, Cav.</i>	163	<i>lætum, Forst.</i>	563
<i>vesiculata, Col.</i>	167	<i>Myosotidium, Hook.</i>	471
<i>villosa, Smith</i>	167	<i>nobile, Hook.</i>	472, 1146
<i>Microcalia australis, A. Rich.</i> ..	272	<i>Myosotis, Linn.</i>	458, 1080
<i>Microlæna, R. Br.</i>	852	<i>albida, T. Kirk</i>	464
<i>avenacea, Hook. f.</i>	853	<i>albosericea, Hook. f.</i>	465
<i>polynoda, Hook. f.</i>	853	<i>amabilis, Cheesem.</i>	468
<i>ramosissima, Col.</i>	854	<i>angustata, Cheesem.</i>	465
<i>stipoides, R. Br.</i>	852	<i>antarctica, Hook. f.</i>	461
<i>Micromeria Cunninghamii, Benth.</i> ..	568	<i>arvensis, Lam.</i>	1080
<i>Microseris, Don.</i>	384	<i>australis, R. Br.</i>	462
<i>Forsteri, Hook. f.</i>	384	<i>cæspitosa, Schultz</i>	1080
<i>pygmæa, Raoul</i>	385	<i>capitata, Hook. f.</i>	463
<i>Microtis, R. Br.</i>	673	<i>Cheesemani, Petrie</i>	461
<i>Banksii, A. Cunn.</i>	673	<i>collina, Hoffm.</i>	1080
<i>longifolia, Col.</i>	673	<i>concinna, Cheesem.</i> ..	470, 1146
<i>papillosa, Col.</i>	673	<i>decora, T. Kirk</i>	462
<i>porrifolia, R. Br.</i>	673	<i>explanata, Cheesem.</i>	464
<i>Mida eucalyptioides, A. Cunn.</i> ..	624	<i>Forsteri, Lehm.</i>	463
<i>myrtifolia, A. Cunn.</i>	624	<i>Goyeni, Petrie</i>	466
<i>salicifolia, A. Cunn.</i> ..	624	<i>Hamiltoni, Col.</i>	463
<i>Mimulus, Linn.</i>	484, 1082	<i>Hectori, Hook. f.</i>	460
<i>Colensoi, T. Kirk</i>	485	<i>læta, Cheesem.</i>	468
<i>luteus, Linn.</i>	1082	<i>Lyallii, Hook. f.</i>	470
<i>moschatas, Dougl.</i>	1082	<i>macrantha, Hook. f.</i> ..	471
<i>radicans, Hook. f.</i>	486	<i>Monroi, Cheesem.</i>	469
<i>repens, R. Br.</i>	484	<i>oreophila, Petrie</i>	470
<i>Mirabilis Jalapa, Linn.</i>	1085	<i>palustris, Lam.</i>	1080
<i>Mitrasacme, Labill.</i>	441	<i>petiolata, Hook. f.</i>	467
<i>Cheesemani, Buch.</i>	442, 529	<i>polyantha, Col.</i>	463
<i>Hookeri, Buch.</i>	442, 528	<i>pulvinaris, Hook. f.</i>	460
<i>montana, Hook. f.</i>	442	<i>pygmæa, Col.</i>	461
<i>novæ-zealandiæ, Hook. f.</i> ..	442	<i>saxosa, Hook. f.</i>	469
<i>Petriei, Buch.</i>	442, 536	<i>spathulata, Forst.</i>	466
<i>Mniarum biflorum, Forst.</i> ..	576	<i>spathulata, A. Rich.</i>	463
<i>fasciculatum, Raoul</i>	576		

	Page		Page
<i>Myosotis</i> —continued.		<i>Nephrodium</i> , Rich. ..	1001
<i>sylvatica</i> , Hoffm. ..	1080	<i>decompositum</i> , R. Br. ..	1002
<i>tenuifolia</i> , Col. ..	463	<i>glabellum</i> , A. Cunn. ..	1003
<i>Townsoni</i> , Cheesem. ..	1146	<i>hispidum</i> , Hook. ..	1004
<i>Trailii</i> , T. Kirk ..	461	<i>inæquilaterale</i> , Col. ..	1005
<i>Traversii</i> , Hook. f. ..	464	<i>molle</i> , Desv. ..	1006
<i>uniflora</i> , Hook. f. ..	460	<i>pentangularum</i> , Col. ..	1003
<i>uniflora</i> , Buch. ..	460	<i>setigerum</i> , Baker ..	1004
<i>venosa</i> , Col. ..	463	<i>squamulosum</i> , Hook. f. ..	1002
<i>Myosurus</i> , Linn. ..	6	<i>tenericaule</i> , Hook. ..	1004
<i>aristatus</i> , Benth. ..	6, 1133	<i>Thelypteris</i> , Desv. ..	1002
<i>Myriogyne minuta</i> , Less. ..	360	<i>unitum</i> , R. Br. ..	1005, 1157
<i>Myriophyllum</i> , Linn. ..	150	<i>velutinum</i> , Hook. f. ..	1004
<i>elatinoides</i> , Gaud. ..	151	<i>Nephrolepis</i> , Schott. ..	1006
<i>intermedium</i> , D.C. ..	151	<i>cordifolia</i> , Presl. ..	1006
<i>pedunculatum</i> , Hook. f. ..	152	<i>exaltata</i> , Schott. ..	1007
<i>propinquum</i> , A. Cunn. ..	151	<i>flexuosa</i> , Col. ..	1007
<i>robustum</i> , Hook. f. ..	151	<i>tuberosa</i> , Presl. ..	1007
<i>varicefolium</i> , Hook. f. ..	151	<i>Nertera</i> , Banks & Sol. ..	263
<i>verrucosum</i> , Lindl. ..	152	<i>ciliata</i> , T. Kirk ..	265
<i>Myrsine</i> , Linn. ..	430	<i>Cunninghamii</i> , Hook. f. ..	264
<i>brachyclada</i> , Col. ..	84, 431	<i>depressa</i> , Banks & Sol. ..	264
<i>chathamica</i> , F. Muell. ..	432	<i>dichondræfolia</i> , Hook. f. ..	265
<i>Coxii</i> , Cockayne ..	433	<i>gracilis</i> , Raoul ..	265
<i>divaricata</i> , A. Cunn. ..	434, 1143	<i>montana</i> , Col. ..	264
<i>kermadecensis</i> , Cheesem. ..	431	<i>papillosa</i> , Col. ..	264
<i>montana</i> , Hook. f. ..	433	<i>pusilla</i> , Col. ..	265
<i>neo-zealandensis</i> , Col. ..	433	<i>setulosa</i> , Hook. f. ..	265
<i>nummularia</i> , Hook. f. ..	434	<i>Nesodaphne Tarairi</i> , Hook. f. ..	602
<i>pendula</i> , Col. ..	434	<i>Tawa</i> , Hook. f. ..	602
<i>Richardiana</i> , Endl. ..	432	<i>Nicandra physaloides</i> , Gaertn. ..	1081
<i>salicina</i> , Heward ..	431	<i>Nicotiana acutiflora</i> , A. St. Hil. ..	1082
<i>Urvillei</i> , A. D.C. ..	432	<i>Tabaccum</i> , Linn. ..	1082
<i>MYRSINÆ</i> ..	430, 1143	<i>Nigella damascena</i> , Linn. ..	1063
<i>MYRTACEÆ</i> ..	159, 1073, 1137	<i>Nipholobolus bicolor</i> , Kaulf. ..	1012
<i>Myrtus</i> , Linn. ..	168	<i>rupestris</i> , Spreng. ..	1012
<i>bullata</i> , Soland. ..	168	<i>serpens</i> , Endl. ..	1012
<i>obcordata</i> , Hook. f. ..	169, 1137	<i>Nothochlæna</i> , R. Br. ..	1014
<i>pedunculata</i> , Hook. f. ..	169	<i>distans</i> , R. Br. ..	1015
<i>Ralphii</i> , Hook. f. ..	169	<i>Nothofagus cliffortioides</i> , Oerst. ..	643
<i>NAIADACEÆ</i> ..	745, 1089	<i>fusca</i> , Oerst. ..	641
<i>Nasturtium</i> , Linn. ..	31, 1064	<i>Menziesii</i> , Oerst. ..	641
<i>officinale</i> , R. Br. ..	32, 1064	<i>Solanderi</i> , Oerst. ..	643
<i>palustre</i> , D.C. ..	31	<i>Nothopanax anomalum</i> , Seem. ..	1140
<i>semipinnatifidum</i> , Hook. ..	32	<i>arborescens</i> , Seem. ..	1140
<i>sylvestre</i> , A. Rich. ..	32	<i>Colensoi</i> , Seem. ..	1140
<i>terrestre</i> , R. Br. ..	32	<i>Edgerleyi</i> , Harms ..	1140
<i>Neamya Fieldii</i> , Van Tiegh. ..	1150	<i>integrifolium</i> , Harms ..	1140
<i>Nematoceras macrantha</i> , Hook. f. ..	696	<i>linearis</i> , Harms. ..	1140
<i>oblonga</i> , Hook. f. ..	694	<i>microphyllus</i> , Harms. ..	1140
<i>rivularis</i> , Hook. f. ..	694	<i>simplex</i> , Seem. ..	1140
<i>rotundifolia</i> , Hook. f. ..	695	<i>Sinclairii</i> , Seem. ..	1140
<i>triloba</i> , Hook. f. ..	695	<i>Notophæna Toumatou</i> , Miers ..	101
<i>Nematostigma ixioides</i> , A. Dietr. ..	699	<i>Notospartium</i> , Hook. f. ..	119
<i>Nepeta Cataria</i> , Linn. ..	1084	<i>Carmichaeliæ</i> , Hook. f. ..	119
<i>Glechoma</i> , Benth. ..	1084	<i>torulosum</i> , T. Kirk ..	120

	Page		Page
<i>Notothlaspi</i> , <i>Hook. f.</i> ..	42	<i>Olearia</i> — <i>continued.</i>	
<i>australe</i> , <i>Hook. f.</i> ..	43, 1134	<i>odorata</i> , <i>Petrie</i> ..	293
<i>Hookeri</i> , <i>Buch.</i> ..	35	<i>oleifolia</i> , <i>T. Kirk</i> ..	289
<i>notabile</i> , <i>Buch.</i> ..	43	<i>operina</i> , <i>Hook. f.</i> ..	281, 1141
<i>rosulatum</i> , <i>Hook. f.</i> ..	42	<i>parvifolia</i> , <i>Col.</i> ..	294
NYCTAGINEÆ ..	573, 1085	<i>populifolia</i> , <i>Col.</i> ..	285
<i>Ænothera biennis</i> , <i>Linn.</i> ..	1074	<i>quinquefida</i> , <i>Col.</i> ..	294
<i>odorata</i> , <i>Jacq.</i> ..	1074	<i>ramuliflora</i> , <i>Col.</i> ..	294
<i>tetraptera</i> , <i>Cav.</i> ..	1074	<i>rigida</i> , <i>Col.</i> ..	279, 383
OLACINÆ ..	96, 1135	<i>semidentata</i> , <i>Decaisne</i> ..	280
<i>Olea</i> , <i>Linn.</i> ..	436	<i>Solandri</i> , <i>Hook. f.</i> ..	294
<i>apetala</i> , <i>A. Cunn.</i> ..	438	<i>suavis</i> , <i>Cheesem.</i> ..	287
<i>apetala</i> , <i>Vahl.</i> ..	437	<i>suborbiculata</i> , <i>Col.</i> ..	285
<i>Cunninghamii</i> , <i>Hook. f.</i> ..	437	<i>Traillii</i> , <i>T. Kirk</i> ..	282
<i>lanceolata</i> , <i>Hook. f.</i> ..	438	<i>Traversii</i> , <i>Hook. f.</i> ..	283
<i>montana</i> , <i>Hook. f.</i> ..	438	<i>uniflora</i> , <i>Col.</i> ..	292
OLEACEÆ ..	436	<i>virgata</i> , <i>Hook. f.</i> ..	294
<i>Olearia</i> , <i>Moench</i> ..	277	<i>xanthophylla</i> , <i>Col.</i> ..	279, 346
<i>aggregata</i> , <i>Col.</i> ..	294	ONAGRARIÆ ..	170, 1074, 1137
<i>albida</i> , <i>Hook. f.</i> ..	291	<i>Onobrychis sativa</i> , <i>Lam.</i> ..	1071
<i>Allomii</i> , <i>T. Kirk</i> ..	284	<i>vicicæfolia</i> , <i>Scop.</i> ..	1071
<i>alpina</i> , <i>Buch.</i> ..	288	<i>Onoclea discolor</i> , <i>Swz.</i> ..	976
<i>angulata</i> , <i>T. Kirk</i> ..	291	<i>Onopordon Acanthium</i> , <i>Linn.</i> ..	1078
<i>angustata</i> , <i>Armst.</i> ..	290	<i>Ophioglossum</i> , <i>Linn.</i> ..	1026
<i>angustifolia</i> , <i>Hook. f.</i> ..	281	<i>coriaceum</i> , <i>A. Cunn.</i> ..	1027
<i>avicenniæfolia</i> , <i>Hook. f.</i> ..	291	<i>costatum</i> , <i>R. Br.</i> ..	1028
<i>Buchanani</i> , <i>T. Kirk</i> ..	283	<i>elongatum</i> , <i>A. Cunn.</i> ..	1028
<i>capillaris</i> , <i>Buch.</i> ..	285	<i>lanceolatum</i> , <i>Presl.</i> ..	1027
<i>chathamica</i> , <i>T. Kirk</i> ..	280	<i>lusitanicum</i> , <i>Linn.</i> ..	1027
<i>Colensoi</i> , <i>Hook. f.</i> ..	282, 1141	<i>minimum</i> , <i>Armstr.</i> ..	1027
<i>colorata</i> , <i>Col.</i> ..	287	<i>minimum</i> , <i>Col.</i> ..	1027
<i>consimilis</i> , <i>Col.</i> ..	294	<i>pedunculatum</i> , <i>Desv.</i> ..	1028
<i>coriacea</i> , <i>T. Kirk</i> ..	290	<i>vulgatum</i> , <i>Linn.</i> ..	1028
<i>Cunninghamii</i> , <i>Hook. f.</i> ..	286, 1141	<i>Ophrys unifolia</i> , <i>Forst.</i> ..	673
<i>dentata</i> , <i>Hook. f.</i> ..	286	<i>Oplismenus</i> , <i>Beauv.</i> ..	848
<i>erythropappa</i> , <i>Col.</i> ..	285	<i>æmulus</i> , <i>Kunth</i> ..	849
<i>excorticata</i> , <i>Buch.</i> ..	287, 1141	<i>setarius</i> , <i>Roem. & Schult.</i> ..	849
<i>fasciculifolia</i> , <i>Col.</i> ..	294	<i>undulatifolius</i> , <i>Beauv.</i> ..	848
<i>Forsteri</i> , <i>Hook. f.</i> ..	292	ORCHIDÆ ..	660, 1151
<i>fragrantissima</i> , <i>Petrie</i> ..	292	<i>Oreobolus</i> , <i>R. Br.</i> ..	796
<i>furfuracea</i> , <i>Hook. f.</i> ..	284	<i>pectinatus</i> , <i>Hook. f.</i> ..	797
<i>Haastii</i> , <i>Hook. f.</i> ..	289	<i>pumilio</i> , <i>R. Br.</i> ..	796
<i>Hectori</i> , <i>Hook. f.</i> ..	293	<i>serrulatus</i> , <i>Col.</i> ..	797
<i>Hillii</i> , <i>Col.</i> ..	290	<i>strictus</i> , <i>Berggr.</i> ..	797
<i>ilicifolia</i> , <i>Hook. f.</i> ..	286	<i>Oreomyrrhis</i> , <i>Endl.</i> ..	205
<i>insignis</i> , <i>Hook. f.</i> ..	279	<i>andicola</i> , <i>Endl.</i> ..	206
<i>lacunosa</i> , <i>Hook. f.</i> ..	288	<i>Colensoi</i> , <i>Hook. f.</i> ..	206
<i>laxiflora</i> , <i>T. Kirk</i> ..	293	<i>Haastii</i> , <i>Hook. f.</i> ..	206
<i>Lyallii</i> , <i>Hook. f.</i> ..	283	<i>ramosa</i> , <i>Hook. f.</i> ..	206
<i>macrodonta</i> , <i>Baker</i> ..	286	<i>Oreostylidium</i> , <i>Berggr.</i> ..	391
<i>marginata</i> , <i>Col.</i> ..	280	<i>affine</i> , <i>Col.</i> ..	392
<i>moschata</i> , <i>Hook. f.</i> ..	289	<i>subulatum</i> , <i>Berggr.</i> ..	391
<i>multibracteolata</i> , <i>Col.</i> ..	286	<i>Orobanche minor</i> , <i>Sutt.</i> ..	1083
<i>multiflora</i> , <i>Col.</i> ..	285	OROBANCHEÆ ..	1083
<i>nitida</i> , <i>Hook. f.</i> ..	285	<i>Orthoceras</i> , <i>R. Br.</i> ..	672
<i>nummularifolia</i> , <i>Hook. f.</i> ..	290	<i>caput-serpentis</i> , <i>Col.</i> ..	673
		<i>rubrum</i> , <i>Col.</i> ..	673

	Page		Page
<i>Orthoceras—continued.</i>		<i>Panax—continued.</i>	
<i>Solandri</i> , Lindl.	673	<i>crassifolium</i> , Dene. & Planch.	235
<i>strictum</i> , R. Br.	672, 1152	<i>crassifolium</i> , Buch.	236
<i>Orthopogon æmulus</i> , R. Br.	849	<i>discolor</i> , T. Kirk	234
<i>Osmunda barbara</i> , Thunb.	1024	<i>discolorum</i> , T. Kirk	234
<i>capensis</i> , Linn.	981	<i>Edgerleyi</i> , Hook. f.	229, 1140
<i>discolor</i> , Forst.	976	<i>ferox</i> , T. Kirk	236
<i>procera</i> , Forst.	981	<i>integrifolium</i> , Col.	1140
<i>reptans</i> , Banks & Soland.	982	<i>lineare</i> , Hook. f.	228, 1140
<i>Osteospermum moniliferum</i> , Linn.	1078	<i>Lessonii</i> , D.C.	234
<i>Ottelia ovalifolia</i> , L. Rich.	1087	<i>longissimum</i> , Hook. f.	235
<i>Ourisia</i> , Comm.	547	<i>microphyllum</i> , Col.	230
<i>cæspitosa</i> , Hook. f.	551	<i>simplex</i> , Forst.	229, 1140
<i>calycina</i> , Col.	549	<i>Sinclairii</i> , Hook. f.	230, 1140
<i>Cockayniana</i> , Petrie	550	PANDANÆE	740, 1153
<i>Colensoi</i> , Hook. f.	549	<i>Panicum</i> , Linn.	847, 1089
<i>glandulosa</i> , Hook. f.	552	<i>colonum</i> , Linn.	1089
<i>macrocarpa</i> , Hook. f.	548	<i>crus-galli</i> , Linn.	1089
<i>macrophylla</i> , Hook.	549	<i>glabrum</i> , Gaud.	1089
<i>montana</i> , Buch.	1146	<i>imbecille</i> , Trin.	849
<i>prorepens</i> , Petrie	551	<i>microbachne</i> , Presl.	848
<i>robusta</i> , Col.	549	<i>sanguinale</i> , Linn.	848, 1088
<i>sessilifolia</i> , Hook. f.	550, 1146	<i>Papaver Argemone</i> , Linn.	1063
<i>Oxalis</i> , Linn.	91, 1069	<i>dubium</i> , Linn.	1064
<i>cataractæ</i> , A. Cunn.	92	<i>hybridum</i> , Linn.	1063
<i>cernua</i> , Thunb.	1069	<i>Rhæas</i> , Linn.	1064
<i>ciliifera</i> , A. Cunn.	92	<i>somniferum</i> , Linn.	1064
<i>corniculata</i> , Linn.	91	PAPAVERACEÆ	1063
<i>crassifolia</i> , A. Cunn.	92	<i>Paratrophis</i> , Blume	631
<i>divergens</i> , A. Cunn.	92	<i>Banksii</i> , Cheesem.	633
<i>exilis</i> , A. Cunn.	92	<i>heterophylla</i> , Blume	632
<i>hirta</i> , Linn.	1068	<i>Smithii</i> , Cheesem.	633
<i>laticola</i> , A. Cunn.	92	<i>Parietaria</i> , Tourn.	638
<i>magellanica</i> , Forst.	92	<i>debilis</i> , Forst.	638
<i>propinqua</i> , A. Cunn.	92	<i>Parsonsia</i> , R. Br.	439
<i>stricta</i> , Linn.	92	<i>albiflora</i> , Raoul	440
<i>tenuicaulis</i> , A. Cunn.	92	<i>capsularis</i> , R. Br.	440
<i>Urvillei</i> , A. Cunn.	92	<i>Forsteri</i> , G. Don.	440
<i>variabilis</i> , Jacq.	1068	<i>heterophylla</i> , A. Cunn.	440
<i>Ozothamnus coralloides</i> , Hook. f.	343	<i>macrocarpa</i> , Col.	440
<i>depressus</i> , Hook. f.	342	<i>ochracea</i> , Col.	440
<i>glomeratus</i> , Hook. f.	342	<i>rosea</i> , Raoul	440
<i>lanceolatus</i> , Buch.	342	<i>variabilis</i> , Lindl.	440
<i>microphyllus</i> , Hook. f.	342	<i>Pascalja glauca</i> , Orteg.	1076
<i>Selago</i> , Hook. f.	343	<i>Paspalum</i> , Linn.	844, 1089
<i>Vauvilliersii</i> , Homb. & Jacq.	346	<i>Digitaria</i> , Poir.	845
<i>Pachycladon</i> , Hook. f.	36	<i>dilatatum</i> , Poir.	1089
<i>elongata</i> , Buch.	35	<i>distichum</i> , Linn.	846
<i>glabra</i> , Buch.	37	<i>orbiculare</i> , Forst.	845
<i>novæ-zealandiæ</i> , Hook. f.	36	<i>scrobiculatum</i> , Linn.	845
PALMÆ	739	<i>Passerina Gnidia</i> , Forst.	609
<i>Panax</i> , Linn.	228, 1140	<i>longifolia</i> , Thunb.	609
<i>anomalum</i> , Hook.	230	<i>pilosa</i> , Linn. f.	611
<i>arboresum</i> , Forst.	231, 1140	<i>prostrata</i> , Forst.	612
<i>Colensoi</i> , Hook. f.	231, 1140	<i>villosa</i> , Thunb.	612
<i>coriaceum</i> , Regel	235	<i>Passiflora</i> , Linn.	188
		<i>tetrandra</i> , Banks & Sol.	188

	Page		Page
PASSIFLOREÆ	187	<i>Phragmites communis</i> , Trin. ..	894
<i>Pelargonium</i> , L'Herit. ..	90, 1069	<i>Phrygilanthus</i> , Eichl. ..	1150
<i>australe</i> , Jacq. ..	91	<i>Raoulii</i> , Engl. ..	1150
<i>clandestinum</i> , L'Herit. ..	91	<i>tenuiflorus</i> , Engl. ..	1150
<i>grossularioides</i> , Ait. ..	91	<i>Phyllachne</i> , Forst. ..	389
<i>quercifolium</i> , L'Herit. ..	1069	<i>clavigera</i> , F. Muell. ..	390
<i>zonale</i> , L'Herit. ..	1069	<i>Colensoi</i> , Berggr. ..	390
<i>Pellaea</i> , Link. ..	968	<i>Haastii</i> , Berggr. ..	391
<i>falcata</i> , Fee. ..	968	<i>rubra</i> , Cheesem. ..	391
<i>rotundifolia</i> , Hook. ..	969	<i>sedifolia</i> , F. Muell. ..	393
<i>Pennantia</i> , Forst. ..	96	<i>subulata</i> , F. Muell. ..	392
<i>corymbosa</i> , Forst. ..	97, 1135	<i>Phyllocladus</i> , L. C. Rich. ..	657
<i>odorata</i> , Raoul. ..	1135	<i>alpinus</i> , Hook. f. ..	659
<i>Pentachondra</i> , R. Br. ..	409	<i>asplenifolius</i> , Hook. f. ..	659
<i>mucronata</i> , Hook. f. ..	1143	<i>glaucus</i> , Carr. ..	658
<i>pumila</i> , R. Br. ..	410, 1143	<i>rhomboidalis</i> , A. Rich. ..	658, 659
<i>rubra</i> , Col. ..	410	<i>trichomanoides</i> , D. Don. ..	658
<i>Peperomia</i> , Ruiz & Pav. ..	596	<i>Phylloglossum</i> , Kunze ..	1032
<i>Endlicheri</i> , Miq. ..	596	<i>Drummondii</i> , Kunze ..	1033
<i>muricatulata</i> , Col. ..	597	<i>Phymatodes Billardieri</i> , Presl. ..	1014
<i>novæ-zealandiæ</i> , Col. ..	596	<i>pustulata</i> , Presl. ..	1013
<i>reflexa</i> , A. Dietr. ..	596, 1147	<i>Physalis peruviana</i> , Linn. ..	1081
<i>Urvilleana</i> , A. Rich. ..	597	<i>Phytolacca octandra</i> , Linn. ..	1085
<i>Peplis Portula</i> , Linn. ..	1073	PHYTOLACCACEÆ	1085
<i>Peraxilla Colensoi</i> , Van Tiegh. ..	1148	<i>Picris</i> , Linn. ..	385, 1079
<i>decussata</i> , Van Tiegh. ..	1149	<i>attenuata</i> , A. Cunn. ..	385
<i>Haastii</i> , Van Tiegh. ..	1149	<i>echioides</i> , Linn. ..	1079
<i>punctata</i> , Van Tiegh. ..	1148	<i>hieracioides</i> , Linn. ..	385
<i>tetrapetala</i> , Van Tiegh. ..	1148	<i>Pilularia</i> , Linn. ..	1030
<i>uniflora</i> , Van Tiegh. ..	1149	<i>novæ-zealandiæ</i> , T. Kirk ..	1030
<i>Periploca capsularis</i> , Forst. ..	440	<i>Pimelea</i> , Banks & Soland. ..	607
<i>Pernettya</i> , Gaud. ..	408	<i>angulata</i> , Col. ..	609
<i>macrostigma</i> , Col. ..	406, 408	<i>arenaria</i> , A. Cunn. ..	612, 1147
<i>nana</i> , Col. ..	408	<i>axillaris</i> , Banks & Soland. ..	1147
<i>polyphylla</i> , Col. ..	408	<i>bicolor</i> , Col. ..	612
<i>tasmanica</i> , Hook. f. ..	408	<i>buxifolia</i> , Hook. f. ..	610
<i>Persoonia</i> , Smith ..	605	<i>congesta</i> , F. Muell. ..	1147
<i>Tora</i> , A. Cunn. ..	605	<i>dichotoma</i> , Col. ..	611
<i>Toro</i> , Hook. f. ..	605	<i>Gnidia</i> , Willd. ..	609
<i>Toru</i> , A. Cunn. ..	605	<i>Haastii</i> , T. Kirk ..	611
<i>Petroselinum filiforme</i> , A. Rich. ..	205	<i>heterophylla</i> , Col. ..	612
<i>prostratum</i> , D.C. ..	205	<i>lævigata</i> , Gaertn. ..	612
<i>Petunia parviflora</i> , Juss. ..	1082	<i>lanceolata</i> , Col. ..	609
<i>Peucedanum geniculatum</i> , Forst. ..	224	<i>longifolia</i> , Banks & Sol. ..	609, 1147
<i>sativum</i> , Benth. & Hook. f. ..	1074	<i>Lyallii</i> , Hook. f. ..	614
<i>Phalaris arundinacea</i> , Linn. ..	1090	<i>microphylla</i> , Col. ..	612
<i>canariensis</i> , Linn. ..	1090	<i>montana</i> , Col. ..	610
<i>Phebalium</i> , Vent. ..	93	<i>pilosa</i> , Willd. ..	611
<i>nudum</i> , Hook. ..	93	<i>polycephala</i> , Col. ..	608
<i>Philippodendron regium</i> , Poit. ..	78	<i>prostrata</i> , Willd. ..	612
<i>Phleum pratense</i> , Linn. ..	1090	<i>rugulosa</i> , Col. ..	612
<i>Phormium</i> , Forst. ..	715	<i>sericeo-villosa</i> , Hook. f. ..	614
<i>Colensoi</i> , Hook. f. ..	716	<i>similis</i> , Col. ..	609
<i>Cookianum</i> , Le Jolis ..	716, 1153	<i>stylosa</i> , Col. ..	610
<i>Forsterianum</i> , Col. ..	717	<i>subsimilis</i> , Col. ..	610
<i>Hookeri</i> , Gunn. ..	717	<i>Suteri</i> , T. Kirk ..	613, 1147
<i>tenax</i> , Forst. ..	716	<i>Traversii</i> , Hook. f. ..	610

	Page		Page
<i>Pimelea</i> — <i>continued</i> .		<i>Plantago</i> — <i>continued</i> .	
<i>urvilleana</i> , A. Rich.	613	<i>dasyphylla</i> , Col.	571
<i>villosa</i> , Banks & Sol.	1147	<i>hamiltoni</i> , Kirk	573
<i>virgata</i> , Vahl.	611, 1147	<i>hirtella</i> , H. B. K.	1084
<i>Piper</i> , Linn.	595	<i>lanceolata</i> , Linn.	570, 1084
<i>æmulum</i> , Endl.	596	<i>lanigera</i> , Hook. f.	572
<i>excelsum</i> , Forst.	595	<i>major</i> , Linn.	570, 1084
<i>latifolium</i> , Forst.	595	<i>media</i> , Linn.	570, 1084
<i>simplex</i> , Endl.	597	<i>picta</i> , Col.	572
PIPERACEÆ	594, 1147	<i>Raoulii</i> , Decne.	570
<i>Pisonia</i> , Linn.	574	<i>spathulata</i> , Hook. f.	571
<i>Brunoniana</i> , Endl.	574	<i>triandra</i> , Berggr.	572
<i>Mooreana</i> , F. Muell.	574	<i>uniflora</i> , Hook. f.	573
<i>Sinclairii</i> , Hook. f.	574	<i>varia</i> , A. Cunn.	571
PITTOPOREÆ	51, 1134	<i>varia</i> , R. Br.	1084
<i>Pittosporum</i> , Banks	51	<i>Platyloma falcatum</i> , J. Smith	969
<i>Buchanani</i> , Hook. f.	54	<i>rotundifolium</i> , J. Smith	969
<i>Colensoi</i> , Hook. f.	53	<i>Pleopeltis pustulata</i> , Moore	1013
<i>cornifolium</i> , A. Cunn.	59	<i>Pleurophyllum</i> , Hook. f.	295
<i>crassifolium</i> , A. Cunn.	58	<i>criniferum</i> , Hook. f.	295, 1142
<i>crenatum</i> , Putterlich	60	<i>Gilliesianum</i> , T. Kirk	296
<i>Dallii</i> , Cheesem.	1134	<i>Hombrovi</i> , Decne.	296
<i>elegans</i> , Raoul	61	<i>Hookeri</i> , Buch.	296
<i>ellipticum</i> , T. Kirk	57	<i>Hookerianum</i> , T. Kirk	296
<i>engenioides</i> , A. Cunn.	60	<i>oresigenesum</i> , Decne.	1142
<i>Fairchildii</i> , Cheesem.	58	<i>speciosum</i> , Hook. f.	295
<i>fasciculatum</i> , Hook. f.	53	<i>Pleurosorus rutæfolius</i> , Fée	1016
<i>Gilliesianum</i> , T. Kirk	60	<i>Poa</i> , Linn.	898
<i>Huttonianum</i> , T. Kirk	54	<i>acicularifolia</i> , Buch.	909
<i>intermedium</i> , T. Kirk	54	<i>albida</i> , Buch.	912
<i>Kirkii</i> , Hook. f.	59	<i>anceps</i> , Forst.	904
<i>microcarpum</i> , Putterlich	61	<i>annua</i> , Linn.	898, 1092
<i>obcordatum</i> , Raoul	55	<i>Astoni</i> , Petrie	1155
<i>ovatum</i> , T. Kirk	57	<i>australis</i> , A. Rich.	904
<i>patulum</i> , Hook. f.	56, 1134	<i>australis</i> , R. Br.	908
<i>pimeleoides</i> , R. Cunn.	60	<i>breviglumis</i> , Hook. f.	913
<i>radicans</i> , R. Cunn.	60	<i>cæspitosa</i> , Forst.	907
<i>Ralphii</i> , T. Kirk	57	<i>chathamica</i> , Petrie	907
<i>reflexum</i> , R. Cunn.	60	<i>Cheesemania</i> , Hack.	906
<i>rigidum</i> , Hook. f.	55	<i>Colensoi</i> , Hook. f.	908
<i>tenuifolium</i> , Banks & Sol.	53	<i>Collinsii</i> , T. Kirk	910
<i>umbellatum</i> , Banks & Sol.	58	<i>compressa</i> , Linn.	1092
<i>virgatum</i> , T. Kirk	56	<i>Cookii</i> , Hook. f.	901
<i>Plagianthus</i> , Forst.	76	<i>dipsacea</i> , Petrie	906, 1156
<i>betulinus</i> , A. Cunn.	77	<i>exigua</i> , Hook. f.	911
<i>chathamica</i> , Cockayne	78	<i>flabellata</i> , Hook. f.	901
<i>cymosus</i> , T. Kirk	77, 1135	<i>foliosa</i> , Hook. f.	900
<i>divaricatus</i> , Forst.	76	<i>Hamiltoni</i> , T. Kirk	1156
<i>linariifolia</i> , Buch.	76, 258	<i>incrassata</i> , Petrie	911
<i>Lyallii</i> , Hook. f.	76, 80	<i>imbecilla</i> , Forst.	913
<i>urticinus</i> , A. Cunn.	78	<i>intermedia</i> , Buch.	908
PLANTAGINÆÆ	569, 1084	<i>Kirkii</i> , Buch.	910
<i>Plantago</i> , Linn.	569, 1084	<i>lævis</i> , R. Br.	908
<i>aucklandica</i> , Hook. f.	570	<i>Lindsayi</i> , Hook. f.	910
<i>Brownii</i> , Rap.	571	<i>litorosa</i> , Cheesem.	902, 1156
<i>carcosa</i> , R. Br.	572	<i>Mackayi</i> , Buch.	910
<i>coronopus</i> , Linn.	1084	<i>Maniototo</i> , Petrie	912

	Page		Page
<i>Poa</i> —continued.		<i>Polypodium</i> —continued.	
<i>Matthewsii</i> , Petrie ..	913	<i>crassium</i> , T. Kirk ..	1010
<i>memoralis</i> , Linn. ..	1092	<i>Cunninghamii</i> , Hook. ..	1012
<i>novæ-zealandiæ</i> , Hack. ..	901	<i>dealbatum</i> , Forst. ..	948
<i>polyphylla</i> , Hack. ..	903	<i>dichotomum</i> , Thunb. ..	1020
<i>pratensis</i> , Linn. ..	898, 1092	<i>grammitidis</i> , R. Br. ..	1011
<i>purpurea</i> , T. Kirk ..	910	<i>medullare</i> , Forst. ..	948
<i>pusilla</i> , Berggr. ..	905, 1156	<i>novæ-zealandiæ</i> , Bak. ..	1014
<i>pygmæa</i> , Buch. ..	909	<i>nymphale</i> , Forst. ..	1006
<i>ramosissima</i> , Hook. f. ..	902	<i>paradoxum</i> , Col. ..	1010
<i>sclerophylla</i> , Berggr. ..	912	<i>penna-marina</i> , Poir. ..	980
<i>seticulmis</i> , Petrie ..	904	<i>pennigerum</i> , Forst. ..	1009
<i>trivialis</i> , Linn. ..	1092	<i>Phymatodes</i> , Linn. ..	1014
<i>Walkeri</i> , T. Kirk ..	915	<i>Phymatodes</i> , A. Rich. ..	1014
<i>Podocarpus</i> , L'Herit. ..	647	<i>punctatum</i> , Thunb. ..	1008
<i>acutifolius</i> , T. Kirk ..	649	<i>pustulatum</i> , Forst. ..	1013
<i>Bidwillii</i> , Hoihrenk ..	648	<i>rufobarbatum</i> , Col. ..	1009
<i>biformis</i> , Hook. ..	653	<i>rugulosum</i> , Labill. ..	1009
<i>Cunninghamii</i> , Col. ..	648	<i>rupestre</i> , R. Br. ..	1012
<i>dacrydioides</i> , A. Rich. ..	651	<i>scandens</i> , Forst. ..	1013
<i>ferrugineus</i> , D. Don. ..	650	<i>scandens</i> , Labill. ..	1014
<i>Hallii</i> , T. Kirk ..	648	<i>serpens</i> , Forst. ..	1012
<i>Matai</i> , Lamb. ..	651	<i>setosum</i> , Forst. ..	1005
<i>montanus</i> , Col. ..	650	<i>stellatum</i> , A. Rich. ..	1012
<i>ivalis</i> , Hook. ..	649	<i>subsimile</i> , Col. ..	1009
<i>spicatus</i> , R. Br. ..	650	<i>sylvaticum</i> , Col. ..	998
<i>thuyoides</i> , R. Br. ..	651	<i>tenellum</i> , Forst. ..	1011
<i>Totara</i> , D. Don. ..	648	<i>vestitum</i> , Forst. ..	998
<i>zamiæfolius</i> , A. Rich. ..	645	<i>viscidum</i> , Col. ..	1009
<i>Pæsia scaberula</i> , Kuhn ..	971	<i>viscidum</i> , Spreng. ..	1009
POLEMONIACEÆ ..	1080	<i>Polypogon fugax</i> , Nees ..	1090
<i>Polybotrya nana</i> , Fée ..	983	<i>monspeliensis</i> , Desv. ..	1090
<i>Polycarpon tetraphyllum</i> , Linn. ..	1068	<i>Polystichum aristatum</i> , Presl. ..	1001
<i>Polygala myrtifolia</i> , Linn. ..	1066	<i>aristatum</i> , Hook. f. ..	999
POLYGALEÆ ..	1066	<i>coriaceum</i> , Schott ..	1000
POLYGONACEÆ ..	587, 1085, 1147	<i>hispidum</i> , J. Smith ..	1005
<i>Polygonum</i> , Linn. ..	588, 1085	<i>Richardi</i> , Diels. ..	999
<i>adpressum</i> , A. Cunn. ..	592	<i>venustum</i> , Homb. & Jacq. ..	998
<i>australe</i> , A. Rich. ..	592	<i>vestitum</i> , Presl. ..	998
<i>aviculare</i> , Linn. ..	589	<i>Pomaderris</i> , Labill. ..	98
<i>axillare</i> , Hook. f. ..	593	<i>amæna</i> , Col. ..	101
<i>complexum</i> , A. Cunn. * ..	593	<i>apetala</i> , Labill. ..	99
<i>convolvulus</i> , Linn. ..	1086	<i>Edgerleyi</i> , Hook. f. ..	100
<i>Dryandri</i> , Spreng. ..	589	<i>elliptica</i> , Labill. ..	99
<i>hydropiper</i> , Linn. ..	1086	<i>ericifolia</i> , Hook. ..	100
<i>lapathifolium</i> , Linn. ..	1085	<i>Kumeraho</i> , A. Cunn. ..	99
<i>minus</i> , Linn. ..	590	<i>mollis</i> , Col. ..	100
<i>Persicaria</i> , Linn. ..	1086	<i>phylicæfolia</i> , Lodd. ..	100
<i>plebeium</i> , R. Br. ..	589	<i>Tainui</i> , Hect. ..	100
<i>prostratum</i> , A. Rich. ..	590	<i>Poranthera</i> , Rudge ..	628
<i>serrulatum</i> , Lag. ..	589	<i>alpina</i> , Cheesem. ..	629
<i>Polypodium</i> , Linn. ..	1007	<i>microphylla</i> , Brong. ..	628
<i>adiantiforme</i> , Forst. ..	1000	<i>Portulaca oleracea</i> , Linn. ..	1068
<i>aristatum</i> , Forst. ..	1001	PORTULACEÆ ..	70, 1068, 1135
<i>attenuatum</i> , A. Rich. ..	1012	<i>Potamogeton</i> , Linn. ..	748
<i>australe</i> , Mett. ..	1010	<i>Cheesemanii</i> , A. Benn. ..	749
<i>Billardieri</i> , R. Br. ..	1013	<i>gramineus</i> , Hook. f. ..	750

	Page		Page
Potamogeton—continued.		Pteris, Linn.	969
<i>heterophyllus</i> , Hook. f.	750	<i>affinis</i> , A. Rich.	972
<i>natans</i> , Linn.	748	<i>alpina</i> , Field	967
<i>obtusifolius</i> , Benth.	750	<i>aquilina</i> , Linn.	970
<i>ochreatus</i> , Raoul	750	<i>Brunoniana</i> , Endl.	974
<i>pectinatus</i> , Linn.	750	<i>comans</i> , Forst.	972
<i>polygonifolius</i> , Pourr.	749	<i>cretica</i> , Linn.	970
Potentilla, Linn.	129, 1073	<i>Endlicheriana</i> , Aghard	972
<i>anserina</i> , Linn.	130	<i>esculenta</i> , Forst.	971
<i>anserinoides</i> , Raoul	130	<i>falcata</i> , R. Br.	969
<i>reptans</i> , Linn.	1073	<i>incisa</i> , Thunb.	973
Poterium muricatum, Spach.	1073	<i>Kingiana</i> , Endl.	972
<i>polygamum</i> , Waldst. & Kit.	1073	<i>lomarioides</i> , Col.	970
<i>Sanguisorba</i> , Linn.	1073	<i>longifolia</i> , Linn.	970
Pozoa elegans, Col.	201	<i>macilenta</i> , A. Rich.	973
<i>exigua</i> , Hook. f.	200	<i>microphylla</i> , A. Cunn.	971
<i>Haastii</i> , Hook. f.	201	<i>montana</i> , Col.	974
<i>hydrocotyloides</i> , Hook. f.	202	<i>pendula</i> , Col.	973
<i>microdonta</i> , Col.	203	<i>rotundifolia</i> , Forst.	969
<i>pallida</i> , T. Kirk	202	<i>scaberula</i> , A. Rich.	971
<i>reniformis</i> , Hook. f.	200	<i>seticaulis</i> , Hook.	969
<i>Roughii</i> , Hook. f.	201	<i>tenuis</i> , A. Cunn.	972
<i>trifoliolata</i> , Hook. f.	203	<i>tremula</i> , R. Br.	971
Prasophyllum, R. Br.	674	<i>vespertilionis</i> , Labill.	974
<i>Colensoi</i> , Hook. f.	675	Pterostylis, R. Br.	677
<i>nudum</i> , Hook. f.	676	<i>auriculata</i> , Col.	679
<i>patens</i> , R. Br.	675	<i>australis</i> , Hook. f.	679
<i>pauciflorum</i> , Col.	675	<i>Banksii</i> , R. Br.	679
<i>pumilum</i> , Hook. f.	675	<i>barbata</i> , Lindl.	683, 1152
<i>rufum</i> , R. Br.	676, 1152	<i>emarginata</i> , Col.	679
<i>tunicatum</i> , Hook. f.	676	<i>foliata</i> , Hook. f.	681
<i>variegatum</i> , Col.	676	<i>graminea</i> , Hook. f.	680
Pratia, Gaud.	397	<i>micromega</i> , Hook. f.	680, 1152
<i>angulata</i> , Hook. f.	397, 1143	<i>mutica</i> , R. Br.	683
<i>arenaria</i> , Hook. f.	398	<i>Oliveri</i> , Petrie	680
<i>linnæoides</i> , Hook. f.	400	<i>patens</i> , Col.	679
<i>macrodon</i> , Hook. f.	398	<i>polyphylla</i> , Col.	680
<i>perpusilla</i> , Hook. f.	398	<i>puberula</i> , Hook. f.	682
PRIMULACEÆ	428, 1080	<i>rubella</i> , Col.	682
PROTEACEÆ	604, 1086	<i>speciosa</i> , Col.	679
<i>Prumnopitys spicata</i> , Kent	651	<i>squamata</i> , Hook. f.	683
<i>Prunella vulgaris</i> , Linn.	1084	<i>subsimilis</i> , Col.	679
<i>Prunus Cerasus</i> , Linn.	1072	<i>trifolia</i> , Col.	682
<i>Persica</i> , Stokes	1072	<i>tristis</i> , Col.	684
<i>Pseudopanax</i> , C. Koch	233	<i>trullifolia</i> , Hook. f.	682
<i>Chathamicum</i> , T. Kirk	236	<i>venosa</i> , Col.	681, 1152
<i>crassifolium</i> , C. Koch	235	Pukateria littoralis, Raoul	239
<i>discolor</i> , Harms.	233, 1140	Pygmea ciliolata, Hook. f.	541
<i>ferox</i> , T. Kirk	235, 1140	<i>pulvinaris</i> , Hook. f.	540
<i>Gilliesii</i> , T. Kirk	234	<i>Thomsoni</i> , Buch.	540
<i>Lessonii</i> , C. Koch	234, 1140		
Psilotum, Swz.	1041	Quintinia, A. D.C.	135
<i>heterocarpum</i> , Col.	1042	<i>acutifolia</i> , T. Kirk	135
<i>triquetrum</i> , Swz.	1041	<i>elliptica</i> , Hook. f.	135
Pteridium aquilinum, Kuhn	971	<i>serrata</i> , A. Cunn.	135

	Page		Page
RANUNCULACEÆ ..	1, 1063, 1133	Ranunculus—continued.	
Ranunculus, Linn. ..	7, 1063	recens, T. Kirk ..	19
acaulis, Banks & Sol. ..	25	repens, Linn. ..	1063
acris, Linn. ..	1063	reticulatus, Col. ..	13
acris, A. Rich. ..	18	rivularis, Banks & Sol. ..	25, 1134
amphitricha, Col. ..	25	ruahinicus, Col. ..	10
aquatilis, Linn. ..	1063	rufus, Col. ..	10
areolatus, Petrie ..	1134	sardous, Crantz ..	7, 1063
arvensis, Linn. ..	1063	sceleratus, Linn. ..	1063
aucklandicus, A. Gray ..	22	sericophyllus, Hook. f. ..	17
Baurii, MacOwan ..	10	sessiliflorus, R. Br. ..	27
Berggreni, Petrie ..	16	Sinclairii, Hook. f. ..	17
bitermatus, Smith ..	26	stenopetalus, Hook. ..	26
Buchanani, Hook. f. ..	10	subcaposus, Hook. f. ..	21
bulbosus, Linn. ..	7, 1063	synchronopetalus, Col. ..	10
Cheesemanii, T. Kirk ..	23	tenuicaulis, Cheesem. ..	14, 1133
chordorhizos, Hook. f. ..	15	tenuis, Buch. ..	14
crassipes, Hook. f. ..	26	ternatifolius, T. Kirk ..	23
crithmifolius, Hook. f. ..	15	Traversii, Hook. f. ..	9
depressus, T. Kirk ..	23	trilobatus, T. Kirk ..	22
Enysii, T. Kirk ..	13	uniflorus, Col. ..	26
falcatus, Linn. ..	1063	verticillatus, T. Kirk ..	13
foliosus, T. Kirk ..	21	Raoulia, Hook. f. ..	327
geraniifolius, Hook. f. ..	13	albosericea, Col. ..	329
Godleyanus, Hook. f. ..	11	apice-nigra, T. Kirk ..	329
gracilipes, Hook. f. ..	17	australis, Hook. f. ..	329, 1142
Haastii, Hook. f. ..	14	bryoides, Hook. f. ..	336
Hectori, T. Kirk ..	22, 1133	Buchanani, T. Kirk ..	335
hirsutus, Curt. ..	7, 1063	eximia, Hook. f. ..	332
hirtus, Banks & Sol. ..	18	glabra, Hook. f. ..	330
hydrophilus, Gaud. ..	27	Goyeni, T. Kirk ..	335
incisus, Hook. f. ..	25	grandiflora, Hook. f. ..	333
inconspicuus, Hook. f. ..	25	Haastii, Hook. f. ..	330
insignis, Hook. f. ..	10	Hectori, Hook. f. ..	333
inundatus, R. Br. ..	25	Mackayi, Buch. ..	325, 29, 1142
Kirkii, Petrie ..	19	mammillaris, Hook. f. ..	334
lappaceus, Smith ..	20	Monroi, Hook. f. ..	330
Limosella, F. Muell. ..	26	Parkii, Buch. ..	331
limoselloides, F. Muell ..	26	Petriensis, T. Kirk ..	334
longipetiolatus, Col. ..	24	rubra, Buch. ..	334
Lyallii, Hook. f. ..	9	subsericea, Hook. f. ..	331
macropus, Hook. f. ..	24	subulata, Hook. f. ..	332
Matthewsii, Cheesem. ..	1133	tenuicaulis, Hook. f. ..	329
Monroi, Hook. f. ..	11	Rapanea Kermadecensis, Mez. ..	431
Moseleyi, Hook. f. ..	27	salicina, Mez. ..	432
Muelleri, Buch. ..	11	Urvillei, Mez. ..	432
multiscapus, Hook. f. ..	20	Raphanus sativus, Linn. ..	1066
muricatulus, Col. ..	20	Rapistrum rugosum, All. ..	1066
muricatus, Linn. ..	1063	Raukana Edgerleyi, Seem. ..	229
nivicola, Hook. ..	12, 1133	Renalmia grandiflora, R. Br. ..	700
novæ-zealandiæ, Petrie ..	16	ixioides, Ker-Gawl. ..	699
pachyrhizos, Hook. f. ..	24	Reseda alba, Linn. ..	1066
parviflorus, Linn. ..	7, 27, 1063	lutea, Linn. ..	1066
paucifolius, T. Kirk ..	15	luteola, Linn. ..	1066
pimpinellifolius, Hook. ..	20	RESEDACEÆ ..	1066
pinguis, Hook. f. ..	12	RESTIACEÆ ..	759
plebeius, R. Br. ..	18	Restio simplex, Murr. ..	761
pygmaeus, Wahl. ..	1134		

	Page		Page
<i>Rhabdothermus</i> , A. Cunn. . .	562	<i>Ruppia</i> , Linn. . .	751
<i>scabrosus</i> , Steud. . .	562	<i>maritima</i> , Linn. . .	751
<i>Solandri</i> , A. Cunn. . .	562	<i>rostellata</i> , Koch . .	751
<i>Rhagodia</i> , R. Br. . .	578	RUTACEÆ . .	92
<i>nutans</i> , R. Br. . .	578, 1147		
RHAMNEÆ . .	98	<i>Sagina apetala</i> , Linn. . .	66, 1067
<i>Rhipogonum</i> , Forst. . .	703	<i>procumbens</i> , Linn. . .	66, 1067
<i>parviflorum</i> , R. Br. . .	703	SALICINEÆ . .	1087
<i>scandens</i> , Forst. . .	703	<i>Salicornia</i> , Linn. . .	585
<i>Rhopalostylis</i> , Wendl. & Drude . .	739	<i>australis</i> , Soland. . .	585
<i>Baueri</i> , Wendl. & Drude . .	740	<i>indica</i> , R. Br. . .	586
<i>sapida</i> , Wendl. & Drude . .	740	<i>quinqueflora</i> , Bunge . .	586
<i>Ribes grossularia</i> , Linn. . .	1073	<i>Salix babylonica</i> , Linn. . .	1087
<i>Richardia africana</i> , Kunth . .	1088	<i>fragilis</i> , Linn. . .	1087
<i>Ricinus communis</i> , Linn. . .	1087	<i>Salsola</i> , Linn. . .	587
<i>Robinia Pseud-acacia</i> , Linn. . .	1072	<i>australis</i> , R. Br. . .	587
<i>Ronabea australis</i> , A. Rich. . .	246	<i>fruticosa</i> , Forst. . .	586
<i>Rosa canina</i> , Linn. . .	1073	<i>Kali</i> , Linn. . .	587
<i>multiflora</i> , Thunb. . .	1073	<i>Salvia verbenaca</i> , Linn. . .	1083
<i>rubiginosa</i> , Linn. . .	1073	SALVINIACEÆ . .	1030
ROSACEÆ . .	123, 1071, 1136	<i>Sambucus nigra</i> , Linn. . .	1075
<i>Rostkovia</i> , Desv. . .	721	<i>Samolus</i> , Tourne. . .	429
<i>gracilis</i> , Hook. f. . .	722	<i>littoralis</i> , R. Br. . .	429
<i>magellanica</i> , Hook. f. . .	722	<i>repens</i> , Pers. . .	429
<i>novæ-zealandicæ</i> , Buch. . .	723	SANTALACEÆ . .	623
<i>sphærocarpa</i> , Desv. . .	722	<i>Santalum Cunninghamii</i> , Hook. f. .	624
<i>Rotibella uniflora</i> , A. Cunn. . .	844	<i>Mida</i> , Hook. . .	624
<i>Roubieva multiflora</i> , Moq. . .	1085	SAPINDACEÆ . .	101, 1069
RUBIACEÆ . .	242, 1075, 1140	<i>Saponaria Vaccaria</i> , Linn. . .	1066
<i>Rubus</i> , Linn. . .	124, 1072	<i>Sapota costata</i> , A. D.C. . .	436
<i>australis</i> , Forst . .	125	SAPOTACEÆ . .	434
<i>cissoides</i> , A. Cunn. . .	125	<i>Sarcophilus</i> , R. Br. . .	666
<i>discolor</i> , Weihe & Nees . .	1072	<i>adversus</i> , Hook. f. . .	667
<i>fruticosus</i> , Linn. . .	1072	<i>breviscapa</i> , Col. . .	667
<i>Idæus</i> , Linn. . .	1072	SAXIFRAGEÆ . .	133, 1073, 1137
<i>leucostachys</i> , Smith . .	1072	<i>Scabiosa arvensis</i> , Linn. . .	1075
<i>macrophyllus</i> , Weihe . .	1072	<i>maritima</i> , Linn. . .	1075
<i>parvus</i> , Buch. . .	126	<i>Scævola</i> , Linn. . .	395
<i>rusticanus</i> , Weihe . .	1072	<i>gracilis</i> , Hook. f. . .	395
<i>schmidelioides</i> , A. Cunn. . .	125	<i>novæ-zealandicæ</i> , A. Cunn. . .	49
<i>squarrosus</i> , Kerner . .	125	<i>Scandix glochidiata</i> , Labill. . .	225
<i>Rumex</i> , Linn. . .	590, 1086	<i>pecten-veneris</i> , Linn. . .	1074
<i>Acetosa</i> , Linn. . .	1086	<i>Schedonorus littoralis</i> , Beauv. . .	917
<i>Acetosella</i> , Linn. . .	590, 1086	<i>Schefflera</i> , Forst. . .	232
<i>Brownianus</i> , A. Cunn. . .	591	<i>Cunninghamii</i> , Miq. . .	233
<i>conglomeratus</i> , Murr. . .	1086	<i>digitata</i> , Forst. . .	232
<i>crispus</i> , Linn. . .	590, 1086	<i>Schizæa</i> , Smith . .	1021
<i>cuneifolius</i> , Campd. . .	591	<i>australis</i> , Gaud. . .	1021
<i>Cunninghamii</i> , Meissn. . .	591	<i>bifida</i> , Swz. . .	1022, 1157
<i>flexuosus</i> , Soland. . .	590	<i>dichotoma</i> , Swz. . .	1022
<i>neglectus</i> , T. Kirk . .	591	<i>fistulosa</i> , Labill. . .	1021
<i>obtusifolius</i> , Linn. . .	590, 1086	<i>palmata</i> , Homb. & Jacq. . .	1021
<i>palustris</i> , Smith. . .	1086	<i>propinqua</i> , A. Cunn. . .	1021
<i>pulcher</i> , Linn. . .	1086	<i>Schœnus</i> , Linn. . .	780
<i>sanguineus</i> , Linn. . .	1086	<i>Apogon</i> , Roem. & Schult. . .	783
<i>viridis</i> , Steud. . .	590, 1086	<i>axillaris</i> , Poir. . .	782
		<i>brevifolius</i> , R. Br. . .	780

	Page		Page
<i>Schoenus</i> —continued.		<i>Senebiera coronopus</i> , Poir.	1065
<i>Brownii</i> , Hook. f.	783	<i>didyma</i> , Pers.	1065
<i>capillaris</i> , F. Muell.	789	<i>Senecio</i> , Linn.	368, 1077
<i>Carsei</i> , Cheesem.	781	<i>Adamsii</i> , Cheesem.	381, 1143
<i>concinus</i> , Hook. f.	784	<i>angustifolius</i> , Forst.	373
<i>Moorei</i> , T. Kirk	783	<i>antipodus</i> , T. Kirk	372
<i>nitens</i> , Poir.	783	<i>aquaticus</i> , Hill	1077
<i>pauciflorus</i> , Hook. f.	782	<i>areolatus</i> , Col.	370
<i>rubiginosus</i> , Forst.	786	<i>argutus</i> , A. Rich.	365
<i>tenax</i> , Hook. f.	781	<i>Banksii</i> , Hook. f.	375
<i>Tendo</i> , Banks & Soland.	781	<i>bellidioides</i> , Hook. f.	371
<i>tenuis</i> , T. Kirk	789	<i>Bidwillii</i> , Hook. f.	383
<i>vaccilans</i> , T. Kirk	783	<i>bifistulosus</i> , Hook. f.	381
<i>Scirpus</i> , Linn.	770	<i>Buchanani</i> , Armstr.	383
<i>americanus</i> , Pers.	777	<i>cassinoides</i> , Hook. f.	382
<i>antarcticus</i> , Linn.	774	<i>Cheesemani</i> , Hook. f.	377
<i>aucklandicus</i> , Boeck.	773	<i>Colensoi</i> , Hook. f.	375
<i>basilaris</i> , C. B. Clarke	772	<i>compactus</i> , T. Kirk	380
<i>cartilagineus</i> , Poir.	774	<i>dimorphocarpus</i> , Col.	370, 1077
<i>cernuus</i> , Vahl.	773	<i>distinctus</i> , Col.	378
<i>crassiusculus</i> , Cheesem.	772	<i>elæagnifolius</i> , Hook. f.	382
<i>ebenocarpus</i> , T. Kirk	774	<i>Forsteri</i> , Hook. f.	367
<i>fluitans</i> , Linn.	772	<i>geminatus</i> , T. Kirk	384
<i>fluvialis</i> , Asa Gray	778	<i>glastifolius</i> , Hook. f.	377
<i>foliatus</i> , Hook. f.	782	<i>glaucophyllus</i> , Cheesem.	374
<i>frondosus</i> , Banks & Sol.	777	<i>Greyii</i> , Hook. f.	379
<i>inundatus</i> , Poir.	775	<i>Haastii</i> , Hook. f.	371
<i>lacustris</i> , Linn.	778	<i>Hectori</i> , Buch.	376
<i>lenticularis</i> , Poir.	772, 1154	<i>heterophyllus</i> , Col.	364
<i>maritimus</i> , Linn.	778	<i>hispidulus</i> , A. Cunn.	365
<i>nitens</i> , Boeck.	783	<i>Huntii</i> , F. Muell.	378
<i>nodosus</i> , Rottb.	776	<i>jacobæa</i> , Linn.	370, 1077
<i>novæ-zealandiæ</i> , Col.	777	<i>Kirkii</i> , Hook. f.	376
<i>prolifer</i> , Rottb.	776	<i>lagopus</i> , Raoul	370
<i>pungens</i> , Vahl.	777	<i>latifolius</i> , Banks & Soland.	374
<i>reticularis</i> , Col.	775	<i>lautus</i> , Forst.	373
<i>riparius</i> , Poir.	774	<i>laxifolius</i> , Buch.	379
<i>Savii</i> , Sebast. & Mauri	774	<i>Lyallii</i> , Hook. f.	372
<i>sulcatus</i> , Thouars	775, 1154	<i>mikanioides</i> , Otto	1077
<i>triqueter</i> , R. Br.	777	<i>Monroi</i> , Hook. f.	380, 1143
<i>SCITAMINEÆ</i>	1087	<i>Muelleri</i> , T. Kirk	379
<i>Scleranthus</i> , Linn.	575	<i>multinerve</i> , Col.	378
<i>biflorus</i> , Hook. f.	575	<i>myrianthos</i> , Cheesem.	377
<i>Scleropoa rigida</i> , Griseb.	1092	<i>neglectus</i> , A. Rich.	373
<i>Scopolia lucida</i> , Forst.	239	<i>odoratus</i> , Hook. f.	375
<i>Scorzonera scapigera</i> , Forst.	385	<i>pachyphyllus</i> , Cheesem.	381
<i>SCROPHULARINEÆ</i>	482, 1082, 1146	<i>perdicoides</i> , Hook. f.	378
<i>Scutellaria</i> , Linn.	568	<i>Pottsii</i> , Armstr.	370
<i>humilis</i> , Hook. f.	569	<i>prenanthoides</i> , A. Rich.	364
<i>humilis</i> , R. Br.	568	<i>pumiceus</i> , Col.	375
<i>novæ-zealandiæ</i> , Hook. f.	568	<i>quadridentatus</i> , Labill.	365
<i>Sebæa</i> , R. Br.	445	<i>radiolatus</i> , F. Muell.	374
<i>gracilis</i> , A. Cunn.	445	<i>Reinoldii</i> , Endl.	1143
<i>ovata</i> , R. Br.	445	<i>revolutus</i> , T. Kirk	381
<i>Selliera</i> , Cav.	394	<i>robustus</i> , Buch.	381
<i>fasciculata</i> , Buch.	395	<i>rotundifolius</i> , Hook. f.	383, 1143
<i>microphylla</i> , Col.	395	<i>rufiglandulosus</i> , Col.	375
<i>radicans</i> , Cav.	394	<i>saxifragoides</i> , Hook. f.	372

	Page		Page
Senecio—continued.		<i>Solidago arborescens</i> , Forst.	285
<i>sciadophilus</i> , Raoul ..	377	<i>arborescens</i> , A. Cunn.	377
<i>scorzonerioides</i> , Hook. f.	372	<i>Soliva anthemifolia</i> , R. Br.	1077
<i>Stewartiæ</i> , Armstr. ..	378	<i>sessilis</i> , Ruiz. and Pav.	1077
<i>sylvaticus</i> , Linn.	370, 1077	<i>tenella</i> , A. Cunn.	355
<i>Traversii</i> , F. Muell. ..	371	<i>Sonchus</i> , Tourn.	387, 1079
<i>viridis</i> , T. Kirk ..	383	<i>arvensis</i> , Linn.	1079
<i>vulgaris</i> , Linn.	370, 1077	<i>asper</i> , Hill. . .	387, 1143
<i>Sequoia gigantea</i> , Lindl. & Gord.	644	<i>grandifolius</i> , T. Kirk	388
<i>Setaria glauca</i> , Beauv.	1088	<i>oleraceus</i> , Linn.	388
<i>imberbis</i> , Roem. & Schult.	1089	<i>Sophora</i> , Linn.	122
<i>verticillata</i> , Beauv. ..	1088	<i>chathamica</i> , Cockayne	123
<i>viridis</i> , Beauv. ..	1089	<i>microphylla</i> , Ait.	123
<i>Shawia arborescens</i> , Raoul	285	<i>prostrata</i> , Buch.	123
<i>avicenniaefolia</i> , Raoul	291	<i>tetraptera</i> , J. Mull.	122
<i>furfuracea</i> , Raoul ..	284	<i>Sparganium</i> , Linn.	743
<i>paniculata</i> , Forst. ..	292	<i>angustifolium</i> , R. Br.	744
<i>Sheffieldia repens</i> , Forst.	429	<i>antipodium</i> , Graebner..	744, 1153
<i>Sherardia arvensis</i> , Linn.	1075	<i>simplex</i> , Hook. f. ..	744
<i>Sicyos</i> , Linn. . .	189	<i>subglobosum</i> , Morong..	744
<i>angulata</i> , Linn.	190	<i>Specularia hybrida</i> , A. D.C.	1079
<i>australis</i> , Endl. . .	190	<i>Spergula arvensis</i> , Linn.	1067
<i>Sida Lyallii</i> , F. Muell. ..	80	<i>pentandra</i> , Linn.	1067
<i>Sideroxylon</i> , Linn.	435	<i>Spergularia</i> , Pers.	70, 1068
<i>costatum</i> , F. Muell. ..	435	<i>media</i> , Presl.	70
<i>Siegesbeckia</i> , Linn.	348	<i>rubra</i> , Presl.	70, 1068
<i>orientalis</i> , Linn.	348	<i>Sphærocionium glanduliferum</i> , Presl.	935
<i>Sierversia albiflora</i> , Hook. f.	128	<i>Spinifex</i> , Linn.	850
<i>Silene conica</i> , Linn.	1066	<i>hirsutus</i> , Labill.	850
<i>cucubalus</i> , Wibel ..	1066	<i>sericeus</i> , R. Br.	850
<i>gallica</i> , Linn.	1067	<i>Spiranthes</i> , L. C. Rich. . .	667
<i>inflata</i> , Smith ..	1066	<i>australis</i> , Lindl.	667
<i>nocturna</i> , Linn.	1067	<i>novæ-zealandiæ</i> , Hook. f.	668
<i>nutans</i> , Linn.	1067	<i>Sporobolus</i> , R. Br.	860
<i>Silybum Marianum</i> , Gaertn.	1078	<i>elongatus</i> , R. Br.	861
<i>Simplicia</i> , T. Kirk ..	861	<i>indicus</i> , R. Br.	860
<i>laxa</i> , T. Kirk ..	861	<i>Sporodanthus Traversii</i> , F. Muell.	760
<i>Siphonidium</i> , Armstr. . .	558	<i>Stachys annua</i> , Linn.	1084
<i>longiflorum</i> , Armstr. . .	558	<i>arvensis</i> , Linn.	1084
<i>Sisyrinchium chilense</i> , Hook.	1088	<i>germanica</i> , Linn.	1084
<i>ixioides</i> , Forst. ..	699	<i>palustris</i> , Linn.	1084
<i>micranthum</i> , Cav. ..	1088	<i>Stackhousia</i> , Smith	97
<i>Sisymbrium</i> , Linn.	36	<i>minima</i> , Hook. f.	97
<i>heterophyllum</i> , Forst.	33	<i>uniflora</i> , Col.	98
<i>novæ-zealandiæ</i> , Hook. f.	36, 1134	<i>STACKHOUSEIÆ</i>	97
<i>officinale</i> , Scop. ..	1065	<i>Stæhelia fimbriata</i> , Forst.	348
<i>Sophia</i> , Linn.	1065	<i>Stegania alpina</i> , R. Br. . .	980
<i>Skinnera excoecata</i> , Forst.	186	<i>discolor</i> , A. Rich.	976
<i>Smilax Rhipogonum</i> , Forst.	703	<i>fluviatilis</i> , R. Br.	983
<i>SOLANACEÆ</i> ..	480, 1081	<i>minor</i> , R. Br.	981
<i>Solanum</i> , Linn.	480, 1081	<i>procera</i> , R. Br.	981
<i>auriculatum</i> , Ait.	481, 1081	<i>Steiractis arborescens</i> , D.C.	285
<i>aviculare</i> , Forst.	481	<i>Stellaria</i> , Linn.	62, 1067
<i>laciniatum</i> , Ait.	481	<i>decipiens</i> , Hook. f.	63
<i>marginatum</i> , Linn. f. . .	1081	<i>elatinoides</i> , Hook. f.	64
<i>nigrum</i> , Linn.	481	<i>gracilentia</i> , Hook. f.	65
<i>sodomæum</i> , Linn.	481, 1081	<i>graminea</i> , Linn.	1067
<i>tuberosum</i> , Linn.	481, 1081		

	Page		Page
<i>Stellaria—continued.</i>		<i>Tetranthera caticaris</i> , Hook. f.	603
<i>Holostea</i> , Linn.	1067	<i>Tangao</i> , R. Cunn.	603
<i>media</i> , Linn.	62, 1067	<i>Tetraphæa australis</i> , Raoul	189
<i>minuta</i> , T. Kirk	64	<i>Teucrium</i> , Hook. f.	565
<i>oligosperma</i> , Col.	63	<i>parvifolium</i> , Hook. f.	566
<i>parviflora</i> , Banks & Sol.	63	<i>Thalamia cupressina</i> , Spreng.	654
<i>pellucida</i> , Col.	63	<i>Theleophyton Billardieri</i> , Moq.	585
<i>Roughii</i> , Hook. f.	64	<i>Thelymitra</i> , Forst.	668
<i>uliginosa</i> , Murr.	1067	<i>alba</i> , Col.	670
<i>Stenochlæna heteromorpha</i> , J. Smith	982	<i>carnea</i> , R. Br.	671
<i>Stenotaphrum americanum</i> , Schrank	1090	<i>Colensoi</i> , Hook. f.	670
<i>glabrum</i> , Trin.	1090	<i>concinna</i> , Col.	669, 1151
<i>Stilbocarpa</i> , A. Gray	226	<i>cornuta</i> , Col.	670
<i>Lyallii</i> , Armstr.	227, 1139	<i>cyanea</i> , Lindl.	672
<i>polaris</i> , A. Gray	227	<i>decora</i> , Cheesem.	1151
<i>Stipa</i> , Linn.	856	<i>fimbriata</i> , Col.	669
<i>arundinacea</i> , Benth.	857	<i>formosa</i> , Col.	1151
<i>micrantha</i> , Cav.	874	<i>Forsteri</i> , Swz.	670
<i>Petriei</i> , Buch.	858	<i>imberbis</i> , Hook. f.	671, 1152
<i>setacea</i> , R. Br.	858, 1155	<i>intermedia</i> , Berggr.	670, 1151
<i>teretifolia</i> , Steud.	857	<i>ixioides</i> , Swz.	669
<i>verticillata</i> , Nees.	857, 1090	<i>longifolia</i> , Forst.	669, 1151
<i>Strelitzia montana</i> , Hook. f.	403	<i>nemoralis</i> , Col.	670
<i>Streptachne ramosissima</i> , Trin.	857	<i>nervosa</i> , Col.	669
<i>Strongylosperma australe</i> , Less.	352	<i>pachyphylla</i> , Cheesem.	1151
<i>Stuartina Muelleri</i> , Sond.	1076	<i>pauciflora</i> , Hook. f.	670
STYLIDIEÆ	389	<i>pulchella</i> , Hook. f.	670, 1152
<i>Stylidium subulatum</i> , Hook. f.	392	<i>purpureo-fusca</i> , Col.	670
<i>Snæda</i> , Forsk.	586	<i>stenopetala</i> , Hook. f.	670
<i>australis</i> , Moq.	587	<i>uniflora</i> , Hook. f.	672
<i>maritima</i> , Dum.	586	<i>venosa</i> , R. Br.	671
<i>Suttonia australis</i> , A. Rich.	432	<i>Thlaspi australe</i> , Hook. f.	43
<i>chathamica</i> , Mez	432	<i>Thuya Doniana</i> , Hook.	646
<i>Coxii</i> , Cockayne	433	THYMELÆACEÆ	607, 1147
<i>divaricata</i> , Hook. f.	434	<i>Thymus serpyllum</i> , Linn.	1083
<i>montana</i> , Hook. f.	433	TILIACEÆ	81, 1135
<i>neo-zealandica</i> , Mez	433	<i>Tillæa</i> , Linn.	139, 1073
<i>nummularia</i> , Hook. f.	434	<i>acutifolia</i> , T. Kirk	142
<i>salicina</i> , Hook. f.	432	<i>debilis</i> , Col.	143
<i>Swainsona</i> , Salisb.	121	<i>diffusa</i> , T. Kirk	141
<i>novæ-zealandiæ</i> , Hook. f.	121, 1136	<i>Hamiltoni</i> , T. Kirk	140, 472
<i>Swammerdamia glomerata</i> , Raoul	342	<i>Helmsii</i> , T. Kirk	141
		<i>moschata</i> , D.C.	140
<i>Tanacetum vulgare</i> , Linn.	1077	<i>multicaulis</i> , Petrie	142
<i>Taraxacum</i> , Linn.	386	<i>muscosa</i> , Forst.	143
<i>dens-leonis</i> , Desf.	387	<i>novæ-zealandiæ</i> , Petrie	142
<i>officinale</i> , Wigg	387	<i>purpurata</i> , Hook. f.	143, 1137
<i>Taxodopsis microphylla</i> , F. Muell.	632	<i>pusilla</i> , T. Kirk	142
<i>Teleanthera</i> sp.	1085	<i>Sieberiana</i> , Schultz	143
<i>Tetrachondra</i> , Petrie	472	<i>Sinclairii</i> , Hook. f.	141
<i>Hamiltoni</i> , Petrie	472	<i>trichotoma</i> , Walp.	1073
<i>Tetragonia</i> , Linn.	191	<i>verticillaris</i> , D.C.	143
<i>expansa</i> , Murr.	192	<i>Tmesipteris</i> , Bernh.	1040
<i>halimifolia</i> , Forst.	192	<i>Forsteri</i> , Endl.	1041
<i>implexica</i> , Hook. f.	192	<i>tannensis</i> , Bernh.	1041
<i>trigyna</i> , Banks & Sol.	192	<i>truncata</i> , Desv.	1041

	Page		Page
<i>Todea</i> , Willd.	1024	<i>Triglochin</i> —continued.	
<i>africana</i> , Willd.	1024	<i>palustre</i> , Linn.	747
<i>barbara</i> , Moore	1024	<i>striatum</i> , Ruiz & Pav.	747
<i>hymenophylloides</i> , A. Rich.	1025	<i>triandrum</i> , Michx.	747
<i>marginata</i> , Col.	1025	<i>Trilepidea Adamsii</i> , Van Tiegh.	1149
<i>pellucida</i> , Hook. & Grev.	1025	<i>Ralphii</i> , Van Tiegh.	1149
<i>superba</i> , Col.	1025	<i>Trineuron pusillum</i> , Hook. f.	363
<i>Tolpis umbellata</i> , Bertol.	1078	<i>spathulatum</i> , Hook. f.	361
<i>Torresia redolens</i> , Roem. & Schult.	855	<i>Triodia</i> , R. Br.	895
<i>Townsonia</i> , Cheesem.	691	<i>antarctica</i> , Benth.	877
<i>deflexa</i> , Cheesem.	692	<i>australis</i> , Petrie	896
<i>Tragopogon porrifolius</i> , Linn.	1079	<i>decumbens</i> , Beauv.	1091
<i>Traversia baccharoides</i> , Hook. f.	384	<i>exigua</i> , T. Kirk	895
<i>Trichilia monophylla</i> , A. Rich.	53	<i>pumila</i> , Hack.	896
<i>spectabilis</i> , Forst.	96	<i>Trisetum</i> , Pers.	879
<i>Tricholoma elatinoides</i> , Benth.	488	<i>antareticum</i> , Trin.	880
<i>Trichomanes</i> , Smith	942	<i>Cheesemanii</i> , Hack.	882
<i>Armstrongii</i> , Bak.	938	<i>micratherum</i> , Desv.	897
<i>bivalve</i> , Forst.	941	<i>subspicatum</i> , Beauv.	881
<i>cænopteroides</i> , Harv.	947	<i>Youngii</i> , Hook. f.	881
<i>Colensoi</i> , Hook. f.	945	<i>Trithuria</i> , Hook. f.	755
<i>Cunninghamii</i> , Van der Bosch	945	<i>inconspicua</i> , Cheesem.	756
<i>demissum</i> , Forst.	934	<i>Triticum multiflorum</i> , Banks & Soland.	922
<i>dilatatum</i> , Forst.	934	<i>repens</i> , A. Rich.	922
<i>elongatum</i> , A. Cunn.	946	<i>sativum</i> , Lam.	1093
<i>humile</i> , Forst.	944	<i>scabrum</i> , R. Br.	923
<i>leptophyllum</i> , A. Cunn.	945	<i>Youngii</i> , Hook. f.	923
<i>Lyallii</i> , Hook. & Bak.	943	<i>Trochocarpa novæ-zealandiæ</i> , Col.	410
<i>Malingii</i> , Hook.	938	<i>Trophis opaca</i> , Banks & Soland.	633
<i>multifidum</i> , Forst.	941	<i>opaca</i> , Hook. f.	632
<i>polyodon</i> , Col.	946	<i>Tropæolum majus</i> , Linn.	1069
<i>reniforme</i> , Forst.	943	<i>Tunica prolifera</i> , Scop.	1066
<i>rigidum</i> , Swz.	946	<i>Tupeia</i> , Cham. & Schl.	621, 1148
<i>sanguinolentum</i> , Forst.	931	<i>antarctica</i> , Cham. & Schl.	621, 1150
<i>squarrosum</i> , Forst.	953	<i>Cunninghamii</i> , Miq.	621
<i>strictum</i> , Menz.	945	<i>pubigera</i> , Miq.	621
<i>venosum</i> , R. Br.	944	<i>undulata</i> , Col.	621
<i>venustulum</i> , Col.	944	<i>Typha</i> , Linn.	742
<i>Trifolium agrarium</i> , Linn.	1071	<i>angustifolia</i> , Linn.	743
<i>arvense</i> , Linn.	1070	<i>Brownii</i> , Kunth	743
<i>dubium</i> , Sibth.	1071	<i>latifolia</i> , Forst.	743
<i>filiforme</i> , Linn.	1071	<i>Muelleri</i> , Rohrb.	743
<i>fragiferum</i> , Linn.	1071	<i>TYPHACEÆ</i>	742, 1153
<i>glomeratum</i> , Linn.	1071	<i>Ulex europæus</i> , Linn.	1070
<i>hybridum</i> , Linn.	1071	<i>UMBELLIFERÆ</i>	193, 1074, 1137
<i>incarnatum</i> , Linn.	1070	<i>Uncina</i> , Pers.	797
<i>medium</i> , Linn.	1070	<i>alopecurioides</i> , Col.	802
<i>ochroleucum</i> , Huds.	1070	<i>australis</i> , Pers.	802
<i>pratense</i> , Linn.	1070	<i>Banksii</i> , Boott.	803
<i>procumbens</i> , Linn.	1071	<i>bracteata</i> , Col.	802
<i>repens</i> , Linn.	1071	<i>cæspitosa</i> , Boott	801, 1154
<i>resupinatum</i> , Linn.	1071	<i>capillaris</i> , Col.	803
<i>scabrum</i> , Linn.	1070	<i>Cheesemaniana</i> , Boeck.	800
<i>subterraneum</i> , Linn.	1070	<i>Clarkei</i> , Petrie	800
<i>Triglochin</i> , Linn.	746	<i>compacta</i> , R. Br.	800
<i>filifolium</i> , Sieb.	747		
<i>flaccidum</i> , A. Cunn.	747		

	Page		Page
Uncina—continued.		VERBENACEÆ	564, 1083, 1147
<i>compacta</i> , A. Rich.	802	<i>Veronica</i> , Linn.	490, 1082
<i>debilis</i> , F. Muell.	805	<i>acutiflora</i> , Benth.	507
<i>distans</i> , Boott	803	<i>agrestis</i> , Linn.	492, 1082
<i>disticha</i> , Col.	803	<i>amabilis</i> , Cheesem.	506
<i>divaricata</i> , Boott.	800	<i>amplexicaulis</i> , Armstr.	525
<i>ferruginea</i> , Boott	802	<i>Anagallis</i> , Linn.	546
<i>filiformis</i> , Boott	805	<i>Andersoni</i> , Lindl. & Paxt.	504
<i>fusco-vaginata</i> , Kuk.	801	<i>anomala</i> , Armstr.	523
<i>Hookeri</i> , Boott	804	<i>angustifolia</i> , A. Rich.	508
<i>horizontalis</i> , Col.	801	<i>arborea</i> , Buch.	509
<i>laxiflora</i> , Petrie	803	<i>areolata</i> , Col.	499, 1083
<i>leptostachya</i> , Raoul	803	<i>Armstrongii</i> , T. Kirk	532
<i>Lindleyana</i> , Kunth	802	<i>arvensis</i> , Linn.	492, 499, 1083
<i>nervosa</i> , Boott	800	<i>azurea</i> , Col.	515
<i>nigra</i> , Col.	802	<i>Balfouriana</i> , Hook. f.	517
<i>obtusata</i> , Col.	803	<i>Barkeri</i> , Cockayne	500
<i>polyneura</i> , Col.	802	<i>Benthami</i> , Hook. f.	537
<i>purpurata</i> , Petrie	801	<i>Bidwillii</i> , Hook.	543
<i>rigida</i> , Petrie	804	<i>Buchanani</i> , Hook. f.	526
<i>rigidula</i> , Steud.	802	<i>Buxbaumii</i> , Ten.	499, 1082
<i>riparia</i> , R. Br.	803, 1154	<i>buxifolia</i> , Benth.	522
<i>rubra</i> , Boott	804	<i>calycina</i> , A. Cunn.	546
<i>rupestris</i> , Raoul	804	<i>canescens</i> , T. Kirk	547
<i>scaberrima</i> , Nees	802	<i>canterburiensis</i> , Armstr.	520
<i>scabra</i> , Boott	803	<i>carnea</i> , Armstr.	499
<i>Sinclairii</i> , Boott.	799	<i>carnosula</i> , Hook. f.	524
<i>tenella</i> , R. Br.	799	<i>catarractæ</i> , Forst.	542
<i>variegata</i> , Col.	802	<i>chathamica</i> , Buch.	507
Urtica, Linn.	634, 1087	<i>Cheesemani</i> , Benth.	547, 1146
<i>aucklandica</i> , Hook. f.	635	<i>ciliolata</i> , Benth. & Hook. f.	540
<i>australis</i> , Hook. f.	635	<i>coarctata</i> , Cheesem.	531
<i>debilis</i> , Endl.	638	<i>Cockayniana</i> , Cheesem.	522, 1146
<i>dioica</i> , Linn.	636, 1087	<i>Colensoi</i> , Hook. f.	513
<i>ferox</i> , Forst.	634	<i>compacta</i> , Col.	544
<i>incisa</i> , Poir.	635	<i>Cookiana</i> , Col.	501
<i>lucifuga</i> , Hook. f.	636	<i>Coziana</i> , T. Kirk	507
<i>urens</i> , Linn.	1087	<i>cupressoides</i> , Hook. f.	533
URTICACEÆ	630, 1087	<i>Darwiniana</i> , Col.	518
<i>Utricularia</i> , Linn.	559	<i>dasyphylla</i> , T. Kirk	536
<i>Colensoi</i> , Hook. f.	561	<i>decumbens</i> , Armstr.	523
<i>delicatula</i> , Cheesem.	561	<i>decussata</i> , Ait.	516
<i>Mairii</i> , Cheesem.	560	<i>Dieffenbachii</i> , Benth.	500
<i>monanthos</i> , Hook. f.	561	<i>diffusa</i> , Hook. f.	542
<i>novæ-zealandiæ</i> , Hook. f.	560	<i>diosmæfolia</i> , R. Cunn.	511
<i>protrusa</i> , Hook. f.	559	<i>divergens</i> , Cheesem.	502
<i>subsimilis</i> , Col.	560	<i>elliptica</i> , Forst.	516, 1146
<i>vulcanica</i> , Col.	561	<i>elongata</i> , Benth.	546
VALERIANEÆ	1075	<i>epacridea</i> , Hook. f.	535
<i>Valerianella olitoria</i> , Poll.	1075	<i>erecta</i> , T. Kirk	538
<i>Vallisneria spiralis</i> , Linn.	1087	<i>Fairfieldii</i> , Hook. f.	538
<i>Vauthiera australis</i> , A. Rich.	789	<i>finaustrina</i> , Homb. & Jacq.	537
<i>Verbascum Blattaria</i> , Linn.	1082	<i>floribunda</i> , Banks & Soland.	509
<i>Thapsus</i> , Linn.	1082	<i>Forsteri</i> , F. Muell.	500
<i>Verbena bonariensis</i> , Linn.	1083	<i>Gibbsii</i> , T. Kirk	524
<i>officinalis</i> , Linn.	1083	<i>gigantea</i> , Cockayne	504
		<i>Gilliesiana</i> , T. Kirk	527, 1146

	Page		Page
Veronica—continued.		Veronica—continued.	
<i>glauco-cærulea</i> , Armstr. . .	527	<i>quadrifaria</i> , T. Kirk . .	529
<i>glaucophylla</i> , Cockayne . .	518	<i>rakaiensis</i> , Armstr. . .	499
<i>gracillima</i> , Cheesem. . .	510	<i>Raoulii</i> , Hook. f. . .	539
<i>Grayii</i> , Armstr. . .	520	<i>rigidula</i> , Cheesem. . .	514
<i>Haastii</i> , Hook. f. . .	534	<i>rotundata</i> , T. Kirk . .	504
<i>Hectori</i> , Hook. f. . .	531	<i>rugulosella</i> , Col. . .	499, 1083
<i>Hillii</i> , Col. . .	513	<i>rupicola</i> , Cheesem. . .	514
<i>hirsuta</i> , Col. . .	499, 1083	<i>salicifolia</i> , Forst. . .	503
<i>Hookeriana</i> , Walp. . .	544	<i>salicornioides</i> , Hook. f. . .	532
<i>Hulkeana</i> , F. Muell. . .	538	<i>salicornioides</i> , Hort. . .	533
<i>insularis</i> , Cheesem. . .	510	<i>serpyllifolia</i> , Linn. . .	499, 1083
<i>irrigans</i> , T. Kirk . .	542	<i>spathulata</i> , Benth. . .	545
<i>Kermesina</i> , Loud. . .	499	<i>speciosa</i> , R. Cunn. . .	499
<i>Kirkii</i> , Armstr. . .	504	<i>squalida</i> , T. Kirk . .	508
<i>lævis</i> , Benth. . .	515	<i>stenophylla</i> , Steud. . .	509
<i>lanceolata</i> , Benth. . .	542	<i>stricta</i> , Banks & Soland. . .	504
<i>latiseppala</i> , T. Kirk . .	505	<i>subalpina</i> , Cockayne . .	519
<i>Lavaudiana</i> , Raoul . .	539	<i>subrosulata</i> , Col. . .	545
<i>leiophylla</i> , Cheesem. . .	509	<i>subsiniilis</i> , Col. . .	530
<i>Lewisii</i> , Armstr. . .	506	<i>tetragona</i> , Hook. . .	530
<i>ligustrifolia</i> , A. Cunn. . .	502	<i>tetrasticha</i> , Hook. f. . .	528
<i>Lindleyana</i> , Paxt. . .	504	<i>Thomsoni</i> , Cheesem. . .	540
<i>linifolia</i> , Hook. f. . .	542	<i>Traversii</i> , Hook. f. . .	518
<i>loganoides</i> , Armstr. . .	541	<i>triseppala</i> , Col. . .	512
<i>longiracemosa</i> , Col. . .	499, 1033	<i>tumida</i> , T. Kirk . .	529
<i>Lyallii</i> , Hook. f. . .	543	<i>uniflora</i> , T. Kirk . .	536
<i>lycopodioides</i> , Hook. f. . .	530	<i>venustula</i> , Col. . .	511
<i>macrantha</i> , Hook. f. . .	537	<i>vernicaosa</i> , Hook. f. . .	520
<i>macrocalyx</i> , Armstr. . .	534	<i>vulcanica</i> , Col. . .	545
<i>macrocalyx</i> , Col. . .	499, 1083	<i>Vicia cracca</i> , Linn. . .	1072
<i>macrocarpa</i> , Vahl. . .	505	<i>gemella</i> , Crantz . .	1072
<i>macroura</i> , Hook. f. . .	501	<i>gracilis</i> , Lois. . .	1072
<i>marginata</i> , Col. . .	1146	<i>hirsuta</i> , S. F. Gray . .	1072
<i>Matthewsii</i> , Cheesem. . .	517	<i>Narbonensis</i> , Linn. . .	1072
<i>Menziesii</i> , Benth. . .	512	<i>sativa</i> , Linn. . .	1072
<i>monticola</i> , Armstr. . .	521	<i>tetrasperma</i> , Moench. . .	1072
<i>Muelleri</i> , Buch. . .	546	<i>Vinca major</i> , Linn. . .	1080
<i>nivalis</i> , Benth. . .	544	<i>Vincentia anceps</i> , Hook. f. . .	785
<i>nivea</i> , Hook. f. . .	544	<i>gladiata</i> , Boeck. . .	785
<i>obovata</i> , T. Kirk . .	521	<i>Viola</i> , Linn. . .	44, 1036
<i>odora</i> , Hook. f. . .	516	<i>Cunninghamii</i> , Hook. f. . .	45
<i>officinalis</i> , Linn. . .	1083	<i>filiacaulis</i> , Hook. f. . .	44
<i>oligantha</i> , Col. . .	499, 1083	<i>hydrocotyloides</i> , Armstr. . .	45
<i>Olseni</i> , Col. . .	544	<i>Lyallii</i> , Hook. f. . .	45
<i>Parkinsoniana</i> , Col. . .	504	<i>perexigua</i> , Col. . .	45
<i>parviflora</i> , Vahl. . .	508	<i>tricolor</i> , Linn. . .	1066
<i>persica</i> , Poir. . .	492, 499	VIOLARIÆE . .	43, 1066, 1134
<i>Petriei</i> , T. Kirk . .	535	<i>Viscum antarcticum</i> , A. Cunn. . .	618, 1150
<i>pimeleoides</i> , Hook. f. . .	527	<i>antarcticum</i> , Forst. . .	621
<i>pinguifolia</i> , Hook. f. . .	525	<i>clavatum</i> , T. Kirk . .	622, 1151
<i>plebeia</i> , R. Br. . .	545	<i>Lindsayi</i> , Oliver . .	622, 1150
<i>polyphylla</i> , Col. . .	499	<i>pubigerum</i> , A. Cunn. . .	621
<i>propinqua</i> , Cheesem. . .	533	<i>salicornioides</i> , A. Cunn. . .	623, 1150
<i>pubescens</i> , Banks & Soland. . .	503	<i>Vittadinia</i> , A. Rich. . .	319, 1076
<i>pulvinaris</i> , Benth & Hook. f. . .	540	<i>australis</i> , A. Rich. . .	319, 1076

	Page		Page
<i>Vitex</i> , Linn. ..	564	<i>Xanthium spinosum</i> , Linn. ..	1076
<i>littoralis</i> , A. Cunn. ..	565	<i>strumarium</i> , Linn. ..	1076
<i>lucens</i> , T. Kirk ..	565, 1147	<i>Xeranthemum bellidioides</i> , Forst. ..	338
<i>Vitis vinifera</i> , Linn. ..	1069		
<i>Wahlenbergia</i> , Schrad. ..	401	<i>Zannichellia</i> , Linn. ..	751
<i>albomarginata</i> , Hook. ..	403	<i>palustris</i> , Linn. ..	752
<i>cartilaginea</i> , Hook. f. ..	403	<i>Preissii</i> , Lehm. ..	753
<i>gracilis</i> , A. D.C. ..	402	<i>Zanthoxylum novæ-zealandiæ</i> , A. Rich. ..	600
<i>pygmæa</i> , Col. ..	403	<i>Zizania aquatica</i> , Linn. ..	1090
<i>saxicola</i> , A. D.C. ..	402	<i>Zostera</i> , Linn. ..	754
<i>Weinmannia</i> , Linn. ..	138	<i>marina</i> , Linn. ..	754
<i>betulina</i> , A. Cunn. ..	138	<i>Muelleri</i> , Irmisch ..	754
<i>fuchsiaoides</i> , A. Cunn. ..	138	<i>nana</i> , Roth. . .	754
<i>racemosa</i> , Linn. f. ..	139	<i>tasmanica</i> , Martens ..	754
<i>rosæfolia</i> , A. Gray ..	138	<i>Zoysia</i> , Willd. ..	844
<i>sylvicola</i> , Soland. ..	138	<i>pungens</i> , Willd. ..	844
<i>Wintera axillaris</i> , Forst. ..	29		

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